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Environmental Cancer and Heart and Lung Disease
Third Annual Report to Congress

Geomet Technologies, Inc.
Rockville, MD

Prepared for

Task Force on Environmental Cancer and Heart and Lung Disease, Washington, DC

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ENVIRONMENTAL CANCER AND HEART AND LUNG DISEASE

THIRD ANNUAL REPORT TO CONGRESS

August 7, 1980

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TASK FORCE ON
ENVIRONMENTAL CANCER AND HEART AND LUNG DISEASE

U.S. Environmental Protection Agency • National Cancer Institute
National Heart, Lung, and Blood Institute • National Institute for Occupational Safety and Health
National Institute of Environmental Health Sciences • National Center for Health Statistics
Centers for Disease Control • Food and Drug Administration

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This report to Congress presents the accomplishments and activities of the Task Force on Environmental Cancer and Heart and Lung Disease in its third year. Research recommendations are made in four scientific areas, including multimedia pollutant exposure and health effects, transport and fate of pollutants in the biosphere and food chain, biological and chemical measurement methodology and data analysis, and pollutants in ground and surface water sources. Another major recommendation is the establishment of the Interagency Education Program Liaison Group (IEPLG), within the Task Force, to coordinate and stimulate Federal activities in environmental and occupational health professional education. The IEPLG also includes curriculum, faculty, student, continuing education and research subrecommendations. A mechanism to generate an interagency inventory of research programs to identify areas of overlap or oversight is described. Information exchange and liaison activities with related groups are presented; these include information interchange on data bases, risk assessment, and disease costs and publication of a monthly calendar of events and two editions of a directory of interagency Federal groups concerned with environmental health. Task Force subcommittee activities are summarized for health professional environmental health education, environmental exposure and metabolic mechanisms, and standardization of measurements and tests.

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U.S. Environmental Protection Agency
National Cancer Institute
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National Institute for Occupational Safety and Health
National Institute of Environmental Health Sciences
National Center for Health Statistics
Center for Disease Control
Food and Drug Administration

Prepared by the Task Force Working Group
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PREFACE

The Task Force on Environmental Cancer and Heart and Lung Disease was established in accordance with Section 402 of Public Law 95-95, enacted August 7, 1977, for the purpose of recommending and coordinating Federal programs leading to the prevention and reduction of such diseases. The Task Force initially included representatives from the U.S. Environmental Protection Agency, the National Cancer Institute, the National Heart, Lung, and Blood Institute, the National Institute for Occupational Safety and Health, and the National Institute of Environmental Health Sciences. The Administrator of the Environmental Protection Agency (or his delegate) was designated as Chairman by this law. Subsequent legislation, Section 9 of Public Law 95-623 enacted November 9, 1978, added the National Center for Health Statistics and the Center for Disease Control to the membership of the Task Force. In September 1978, the Food and Drug Administration was invited to participate in Task Force activities; it became a formal member in April 1980 by vote of Task Force members. The Task Force is required to report annually to Congress on its progress and problems.

This report describes the work of the Task Force in its third year (September 1979 to August 1980) and outlines plans for the future. Section 1 is an introduction that delineates the responsibilities of the Task Force and summarizes its previous reports. Status summaries of the Task Force's current activities are presented in Section 2. Section 3 describes the recommendations developed during the third year, and Section 4 presents future plans of the Task Force.

Abbreviations

CCERP	-	Committee to Coordinate Environmental and Related Programs
CDC	-	Center for Disease Control
CEQ	-	Council on Environmental Quality
CPSC	-	Consumer Product Safety Commission
DHHS	-	U.S. Department of Health and Human Services
DOL	-	U.S. Department of Labor
ED	-	U.S. Department of Education
EPA	-	U.S. Environmental Protection Agency
FDA	-	Food and Drug Administration
FICE	-	Federal Interagency Committee on Education
HRA	-	Health Resources Administration
IARC	-	International Agency for Research on Cancer
ICGEC	-	Interagency Collaborative Group on Environmental Carcinogenesis
IEPLG	-	Interagency Education Program Liaison Group
IRLG	-	Interagency Regulatory Liaison Group
NAS/IOM	-	National Academy of Sciences/Institute of Medicine
NCAQ	-	National Commission on Air Quality
NCHS	-	National Center for Health Statistics
NCI	-	National Cancer Institute
NCVHS	-	National Committee on Vital and Health Statistics
NHLBI	-	National Heart, Lung, and Blood Institute
NIEHS	-	National Institute of Environmental Health Sciences
NIOSH	-	National Institute for Occupational Safety and Health
NTIS	-	National Technical Information Service
NTP	-	National Toxicology Program
OPP	-	Office of Pesticide Programs
OSHA	-	Occupational Safety and Health Administration
PSU	-	Pennsylvania State University
QC	-	Quality Control
SPRMs	-	Spiked Reference Materials
USDA	-	U.S. Department of Agriculture

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

The Task Force was established by the Clean Air Act Amendments of 1977 to focus efforts by the U.S. Environmental Protection Agency and the various branches of the U.S. Department of Health and Human Services on the development of coordinated, comprehensive Federal research programs and strategies for reduction of the incidence and risks of environmental cancer and heart and lung diseases.

During the first 2 years, as documented in the previous annual reports, the Task Force defined the problem and the subject matter. It examined, inventoried, and categorized information on relevant research programs. Limited areas of special interest were identified and work was initiated through three interagency subcommittees of the Task Force identified as Project Groups.* Activities to review ongoing studies were begun in risk assessment and the costs of environment-related disease. Numerous information exchange and coordination activities were started among the Task Force Agencies, as well as between the Task Force and other Agencies and interagency groups.

WORK OF THE THIRD YEAR

During its third year the Task Force further pursued its efforts through the Project Groups and other activities. Significant products

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* The Project Groups are: Education of the Public and of Health Professionals, Exposure and Metabolic Mechanisms, and Standardization of Measurements and Tests.

began to emerge: a preliminary interagency inventory of research programs, formal recommendations, information exchange activities, and useful reports on numerous subjects. These and other accomplishments have set the stage to allow the Task Force to pursue the development of a comprehensive research program and, especially, comprehensive strategies to reduce the incidence and risks of these environment-caused diseases.

A key accomplishment this year was the development of a mechanism to produce an inventory of all relevant research programs conducted within member Agencies. The inventory provides the first version of information on research programs of eight Agencies in a common form not previously available. It has been used in the development of initial recommendations. These recommendations identify scientific areas warranting increased research efforts for quantification of the relationships between environmental pollution and human cancer and heart and lung disease. The initial program recommendations that have evolved from this first-stage identification process pertain to the following four scientific areas:

1. Multimedia pollutant exposure and health effects
2. Transport and fate of pollutants in the biosphere and food chain
3. Biological and chemical measurement methodology and data analysis
4. Pollutants in ground and surface water sources.

The research Program Inventory also has been useful in Project Group studies of program areas needing increased attention.

The two underlying themes of exchange of information and liaison with related groups also are in response to meeting the congressional mandates. A major emphasis of the Task Force effort has been in the exchange of information among the member Agencies and other appropriate entities. In information exchange, third-year activities have included the interchange of information on data bases, risk assessment, and disease costs; communication with other relevant Federal Agencies and interagency groups, committees and programs; provision of support for collection and coordination of statistical and epidemiological data on environmental health; publication of a monthly calendar and of several directories of interagency groups and data bases.

Another accomplishment was the successful conduct of a workshop by the Project Group on Education. Subsequently, the workshop's findings were developed into a series of comprehensive recommendations addressed to increasing the capability of health professionals in the effective prevention and treatment of environment-related diseases and meeting needs in environmental health manpower. Specifically, these recommendations provide for establishment of an Interagency Education Program Liaison Group that will coordinate and stimulate Federal activities in environmental and occupational health professional education. In addition, curriculum, faculty, students, continuing education, and research recommendations are included. The recommended actions directly address the Task Force's mandate to prevent or reduce the incidence of environment-related diseases.

The Project Group on Exposure and Metabolic Mechanisms is in the process of identifying research needs and developing research strategies to

address these needs. The Project Group on Standardization of Measurements and Tests devised an approach to validate the accuracy and precision of chemical measurements used in quantification of the relationship between an environmental pollutant and human cancer and heart and lung diseases. In addition, feasibility studies were conducted on improved data quality and utility.

TASK FORCE PLANS

In the coming year the Task Force will expand its information exchange activities. The coordination of activities with other Agencies and interagency groups will be strengthened through a more systematic rather than an ad hoc basis. The needs relating to coordination, accessibility, and availability of the Task Force's areas of concern will be identified. The Task Force also will continue to monitor activities in risk assessment.

The Project Groups will continue their work in determining, for their respective areas, the needs for improved knowledge and the feasibility of undertaking interagency activities.

The Program Inventory will be further developed and updated, using improved forms and procedures initiated for the first-stage study conducted this year. Based on the Program Inventory, recommendations developed by other planning groups and the scheme developed this year, the Task Force will formulate specific recommendations. These recommendations will include initiatives for both comprehensive research programs and for comprehensive strategies for reduction of risk.

Section 1

INTRODUCTION

Section 1

INTRODUCTION

THE TASK FORCE RESPONSIBILITY

The Task Force on Environmental Cancer and Heart and Lung Disease was formally organized in November 1977, and is composed of representatives from:

U.S. Environmental Protection Agency (EPA)
National Cancer Institute (NCI)
National Heart, Lung, and Blood Institute (NHLBI)
National Institute for Occupational Safety and Health (NIOSH)
National Institute of Environmental Health Sciences (NIEHS)
National Center for Health Statistics (NCHS)
Center for Disease Control (CDC)
Food and Drug Administration (FDA).*

The Task Force was established to provide a focus for a concerted attack on the national problem of environment-related cancer and heart and lung diseases.** Congress directed the Task Force to recommend comprehensive programs for quantifying the relationships between environmental pollution and these associated diseases and for reducing the risk and incidence of these diseases. The Task Force also was directed to coordinate relevant research, stimulate cooperation among Federal Agencies, and report to Congress annually

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* Added by resolution by the Task Force on April 23, 1980.
** Appendix A includes relevant sections from Public Laws 95-95 and 95-623.

on its progress and difficulties in reaching these objectives. In addition, the Task Force was identified in Section 8 of Public Law 95-623 to have the Secretary of the U.S. Department of Health and Human Services (DHHS), acting through NCHS, to consult with and consider recommendations from the Task Force regarding the collection and coordination of environmental health statistics.

ORGANIZATION AND ACTIVITIES

The third year of Task Force activity represents an important step forward in meeting its objectives. The Task Force documented in the first two annual reports the identification and initiation of a variety of activities that were directed toward the objectives specified in the mandate. These included defining the problem and the subject matter, and examining, collecting, and categorizing data on relevant research programs. An organizational structure was established consisting of the Task Force, a Working Group, and Project Groups for specific areas of interest.* Limited areas of special interest were identified, and Project Groups were initiated for three of them. Review of ongoing activities in risk assessment was begun. Numerous information exchange and coordination activities were initiated among the Task Force Agencies, as well as between the Task Force and other Agencies and interagency groups. During its third year, the Task Force continued to pursue the activities mentioned above and interrelated them in ways directed toward its mandates, as described later in this section and in Section 2.

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* Members of the Task Force, its Working Group, and its Project Groups are listed in Appendix B.

The Task Force has structured its activities into two major groups: core activities and specific area activities (Figure 1). The core activities are those that are generally continuous, and that cover many and sometimes all areas of Task Force concern. The specific area activities refer to specially selected subject areas within the overall scope of the Task Force. These have been treated by the establishment of Project Groups to address the specific problem areas, and are thus ad hoc in purpose and duration.

Core activities include:

- Program Inventory--Compilation and use of information on member Agency research programs in a comprehensive and uniform format
- Information Exchange--
  - Communication with other relevant Federal Agencies and interagency groups, committees, and programs
  - Exchange and circulation of information on data bases and special subjects such as risk assessment and disease costs
  - Provision of support to activities in collection and coordination of statistical and epidemiological data on environmental health
  - Publication of a monthly calendar of events and directories of interagency groups and data bases.

Specific area activities at present include the work of the three Project Groups: (1) Education of the Public and of Health Professionals,

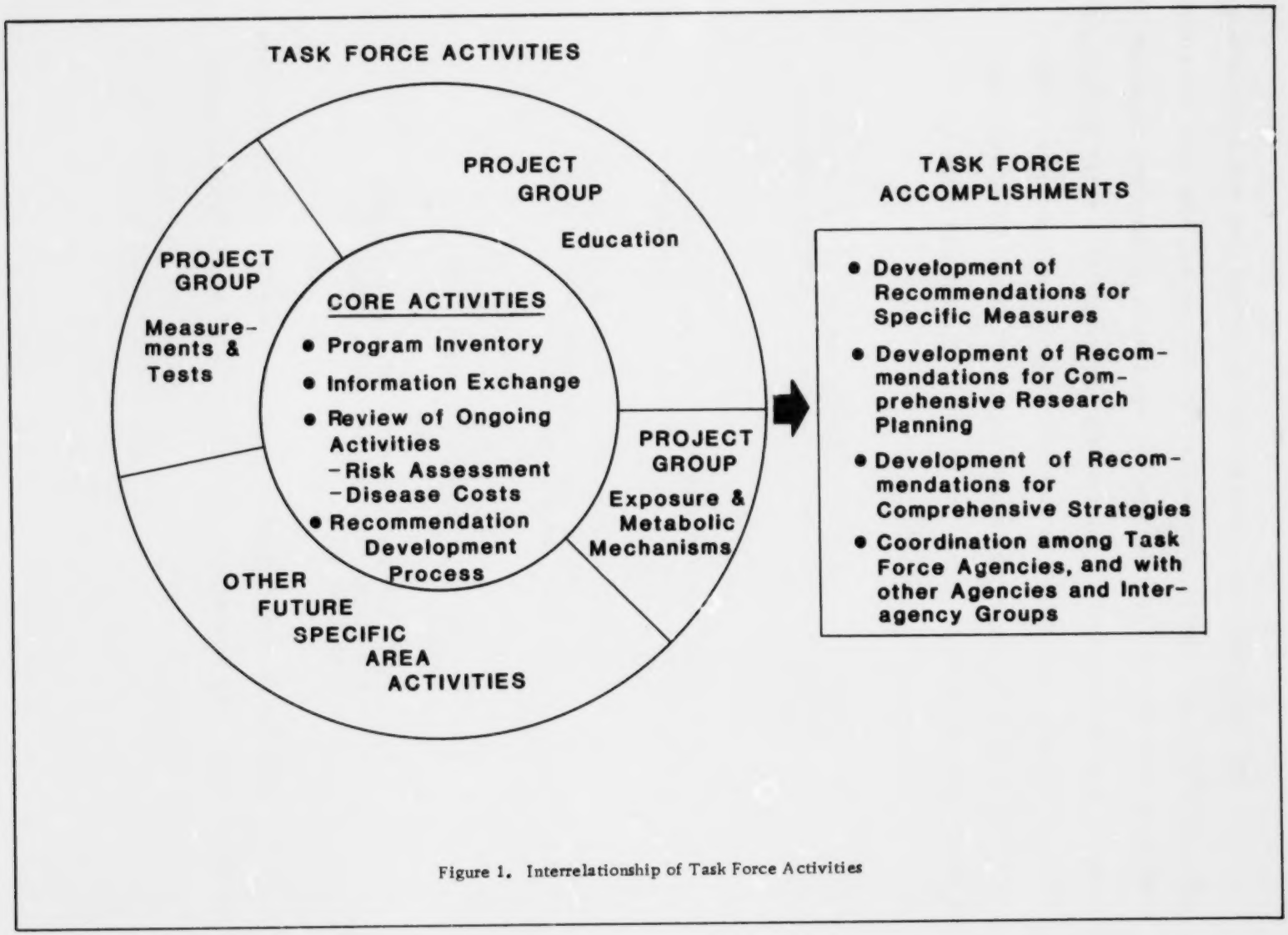
TASK FORCE ACTIVITIES
PROJECT GROUP
Education
PROJECT GROUP
Measure-ments & Tests
CORE ACTIVITIES
• Program Inventory
• Information Exchange
• Review of Ongoing Activities
-Risk Assessment
-Disease Costs
• Recommendation Development Process
PROJECT GROUP
Exposure & Metabolic Mechanisms
OTHER FUTURE SPECIFIC AREA ACTIVITIES
TASK FORCE ACCOMPLISHMENTS
• Development of Recommendations for Specific Measures
• Development of Recommendations for Comprehensive Research Planning
• Development of Recommendations for Comprehensive Strategies
• Coordination among Task Force Agencies, and with other Agencies and Interagency Groups

Figure 1. Interrelationship of Task Force Activities

(2) Exposure and Metabolic Mechanisms, and (3) Standardization of Measurements and Tests. Each of these groups is charged with determining the need for improved knowledge, the contribution that improved knowledge could make to the achievement of Task Force objectives, and the feasibility of undertaking interagency activities to assist in meeting these needs. The three groups are at different stages in their pursuit of these determinations.

These core and specific area activities lead to the accomplishment of the Task Force's mandates for recommendations, coordination, and reporting, as shown on the right side of Figure 1. Task Force accomplishments and its future plans for core and specific area activities are described in the remainder of this report.

Section 2

TASK FORCE EFFORTS AND ACCOMPLISHMENTS

Section 2

TASK FORCE EFFORTS AND ACCOMPLISHMENTS

This section contains the details on activities conducted during the Task Force's third year. It covers the core activities, which include the Program Inventory and information exchange, and the two subjects that have been selected for ongoing review, risk assessment and the costs of environment-related diseases. In the case of specific area activities, efforts and accomplishments of the three Project Groups--Education of the Public and of Health Professionals, Exposure and Metabolic Mechanisms, and Standardization of Measurements and Tests--are presented. The section concludes with a discussion of the process that was devised and used for the development of recommendations.

CORE ACTIVITIES

Program Inventory

One of the major purposes of the Program Inventory is to provide a baseline description of the Task Force Agencies' research programs that can serve as a basis for designing and recommending modifications. The completion of the inventory's first version and its initial uses have shown that it can be accomplished, and it will serve its purpose.

A preliminary listing and description of the research programs that are relevant to the objectives of the Task Force was completed during

the Task Force's third year.* Information was collected on each relevant research program from individuals in each Agency who were coordinators or were otherwise closely associated with the research programs. A form devised for this purpose was completed by Agency representatives for each identified program. A complete description of the process and a copy of the sample form are included in Appendix D. The entries, descriptive titles, and instructions in the form show the kinds of summary information that were requested. These included: program description, resources, person-years effort, objectives, activities and future needs. The classification scheme, which was developed in earlier Task Force work for classifying Agency programs into 15 categories, also was used. These are listed and defined in Appendix D, pages D-8 through D-11.

Three criteria guided the development of the inventory form and the overall inventory approach. These criteria were simplicity, flexibility, and comprehensiveness. The first criterion, simplicity, was considered essential, at least for this initial inventory of research programs for the eight Federal Agencies. In planning the approach for the inventory, the program information for an Agency was gathered at a level at which information is readily available.

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* This initial research Program Inventory is available as a separate document and is listed in Appendix C.

The second criterion, flexibility, was adopted because of the diversity of orientation and activity among the different Agencies.* Each Agency has its own specific mandates and philosophy; each approaches the Task Force with its own needs in mind. The form used in this initial inventory was open ended, so each program entry from an Agency could include any of these unique characteristics. Similarly, the level at which program information was collected was kept flexible for each Agency.

The third criterion was comprehensiveness. An extensive description of all program areas relevant to the mission of the Task Force from all eight Agencies was sought. Each Agency was encouraged to include information on all applicable research programs. Work on data collection was initiated in September 1979, collection was completed by January 1980, and the preliminary report was concluded in March 1980.

The preliminary Program Inventory now includes a compilation of 115 forms, each representing a relevant research program, for all eight member Agencies of the Task Force. Some preliminary work has been done in synthesizing the information included in the input forms, and an example summary table is included in Appendix D. Tables have been prepared to summarize the programs in various ways. The most useful to date has been the one that summarizes the Agency programs using the 15 categories of research activities as rows and four disease endpoints--cancer, heart disease, lung disease, and

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* All Agencies, except for NIEHS, reported programs in their Agency's usual organizational format and identified one or more of the 15 categories that were applicable to each program. The NIEHS submission was specifically based on the 15 categories. As indicated later in this report, the NIEHS method proved to be valuable, since it eliminates inherent duplication in reporting, and will be used in revising the Program Inventory next year.

nonspecific--as columns, to create a 15 x 4 matrix with 60 cells (Appendix D). Information of this nature combined with the basic data in each form has been used in the development of initial recommendations and in work of the Project Group on Exposure and Metabolic Mechanisms.

Some problems and inconsistencies were encountered in developing the input data for the inventory. These partially limit the utility of the inventory as initially developed and require changes in the approach when it is updated during the coming year. Details for the revision of the Program Inventory are discussed in Section 4.

Information Exchange

The Task Force is conducting several information exchange activities. As one aid to the dissemination of information, publication of a calendar of events was initiated by the Task Force in June 1979. Listed in the monthly Calendar are announcements of meetings, conferences, symposia, short courses, public hearings, and workshops that pertain to environmental pollution and those diseases of Task Force concern. The Calendar's usefulness can be seen by the increase in its distribution. Little more than 1 year after its inception, the Calendar has expanded its distribution, in response to requests, to over 900 individuals and organizations, including those from Government, industry, and academia, throughout the United States and in several foreign countries.

The Directory of Federal Interagency Groups Concerned with Environmental Health is now in its second edition (first edition October 1979,

second edition April 1980). The Directory provides a source of information on interagency advisory or policymaking groups at the Federal level. Designed as a reference tool to locate and describe interagency committees, task forces, and other groups, the Directory enhances the availability of information on environmental health. Over 500 requests for copies of the second edition have been filled. This is partly due to the inclusion of the Directory in the National Technical Information Service (NTIS) data base, as well as to individual recommendations and to publicity.

The Task Force is exchanging information on, and is maintaining an awareness of, various data bases, banks, and systems. Of particular interest to the Task Force are the Chemical Substances Information Network of the Interagency Toxic Substances Data Committee, the Domestic Information Display System, and the Interagency Regulatory Liaison Group's Skills Inventory.

A directory identifying and describing exposure data bases is in the preparation stage.* This directory will consist of information on primary resources, i.e., files that contain numerical data to assist in exposure assessment related to toxic chemicals. The directory is being developed as a resource for persons wishing to assess the levels of human exposure to chemical pollutants. It also will provide a means for the definition of availability and usefulness of exposure information. Publication of the first directory is expected early in Fiscal Year 1981.

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* The Directory of Exposure-Related Bases, which is in preparation, is listed in Appendix C.

The Task Force actively communicates with other groups and Federal Agencies. The Task Force has investigated, attended meetings, given presentations, and provided support at various levels to such entities as:

- Interagency Regulatory Liaison Group (IRLG)
- National Toxicology Program (NTP)
- Council on Environmental Quality (CEQ)
- National Commission on Air Quality (NCAQ)
- Federal Interagency Committee on Education (FICE) Subcommittee on Environmental Education
- National Academy of Sciences/Institute of Medicine Planning Committee for the Ongoing Study of Costs of Environment-Related Health Effects (NAS/IOM)
- Subcommittee on Environmental Health Statistics of the National Committee on Vital and Health Statistics (NCVHS)
- DHHS Committee to Coordinate Environmental and Related Programs (CCERP)
- Interagency Collaborative Group on Environmental Carcinogenesis (ICGEC).

A first collaborative workshop to review the progress on joint environmental and occupational cancer studies was held by NCI, NIOSH, and EPA on May 6 through 8, 1980. The workshop reflected the spirit and intentions of this Task Force in fostering closer interagency cooperation in areas of mutual interest. Discussion topics at the meeting, attended by over 130 health scientists, included epidemiology, experimental model systems to identify carcinogens, toxicology, radiation carcinogenesis, data base monitoring, and the importance of interagency programs to address the needs of regulatory Agencies.

The Task Force provided support to NCHS in its development of a plan for the collection and coordination of statistical and epidemiological data on environmental health as required under Public Law 95-623. The Task Force assisted NCHS in review of the current status of environmental health information and data bases. Support also was provided to NCHS in developing a plan for collecting and coordinating statistical and epidemiological data that has been submitted to Congress.

In another information exchange role, the Task Force interacts with various Federal groups concerned with risk assessment and the costs of environment-related diseases, acquiring and disseminating information among member Agencies and to others. These are described below.

Risk Assessment Activity

During the third year, the Task Force substantially expanded its activities in risk assessment, employing two related approaches. First, the Task Force moved to familiarize itself with the risk assessment activities of all major Federal Agencies that have responsibilities in environmental health, and with Federal interagency groups and other organizations whose work includes environmental health components. The objective of this familiarization and continuing liaison has been to keep the Task Force abreast of the risk assessment activities of these Agencies and groups, and to summarize their progress in ways useful to the Task Force Agencies in their collective deliberations on risk assessment issues that relate to cancer and heart and lung diseases. Documents prepared for the Task Force in support of this approach have included:

- "An Option Paper on Risk Assessment," November 6, 1979

- A Comparison of the Scientific and Procedural Bases Used by Federal Agencies for the Regulation of Carcinogens, February 13, 1980.

A part of this latter report dealing with scientific bases is summarized in Appendix D.

The second strategy involves the investigation in some depth of special topics in risk assessment that will be of assistance in Task Force deliberations. These topics have emerged as the familiarization process identified fruitful lines of Task Force inquiry and from the Working Group's deliberations on related subjects. Topics that are currently under investigation include:

- A comparison of the legislative mandates governing Task Force member Agencies in risk assessment
- A comparison of the risk assessment regulations promulgated by Task Force member Agencies.

Costs of Environment-Related Disease

The field of environmental health cost analysis is just emerging; however, several studies are beginning to produce results of possible use in Task Force deliberations. Review of these has been initiated with a view to keeping current on developments in the field. Specific subjects that are of interest include:

- The array of burden-of-illness costs that, for public policymaking purposes, can be usefully and fairly attributed to environment-caused cancer and heart and lung diseases
- The array of economic costs that can be usefully attributed to cancer and heart and lung diseases

- An assessment concerning which of these costs can be estimated with reasonable accuracy using data now available.

Task Force work on all these topics is being coordinated with an NCHS-sponsored planning study conducted by NAS/IOM. Contact has been maintained with this study group from its inception to keep the Task Force informed of the group's activities and results, and to keep the study group apprised of both Task Force needs and interests in environmental health costs, and the activities of the Task Force and its Agencies that may be of use to the study group.

SPECIFIC AREA ACTIVITIES

Project Group on Education of the Public and of Health Professionals

At the conclusion of the second year of the Task Force, the Project Group on Education of the Public and of Health Professionals had conducted a review of environmental and occupational education activities directed at both the public and health professionals. The initial review identified deficiencies and overlaps in environmental education of these two groups. The Project Group made plans to sponsor workshops aimed at promoting a coordinated approach to educating the public and health professionals.

The Project Group decided to target its initial efforts at the health professional community. On October 15 and 16, 1979, the Project Group conducted a workshop entitled "Environmental Education Needs of Health Professionals."* The purpose of this workshop was to identify the needs from

* Summary of the Workshop on Environmental Education Needs of Health Professionals is available as a separate document. See Appendix C for details.

health professionals in environmental education and to develop recommendations aimed at increasing their capability in effective prevention of environment-related diseases. An additional purpose of the workshop was to gather information on the current and planned activities of the participating organizations in environmental and occupational education.

The workshop was attended by 82 representatives from various health scientist, physician, and nursing organizations; selected labor unions; and concerned Federal Agencies. The majority of the 2 workshop days involved structured, small-group sessions designed to focus participant input on the following workshop objectives:

Session I:	What should the future roles of the nurse, health scientist, and physician be in relation to environment-related diseases?
Session II:	What is the role of societal institutions in relation to environment-related diseases?
Session III:	Through what educational approaches can we fulfill the roles of health care professionals in relation to environment- and occupation-related diseases as defined in Session I?

As a result of the workshop, over 350 action statements were constructed from action plans developed during the working sessions. Specific recommendations for various topic areas were developed from the raw workshop

output by the Project Group, who selected those components that specify the most feasible and realistic actions. These actions can initially be taken to establish a coordinated approach to environmental and occupational education of health professionals. Those statements that did not meet the objectives of the workshop or that were considered by the Project Group to be impractical at this time were excluded.

A first draft of the recommendations was distributed to workshop participants and Task Force Working Group members for review. The recommendations were revised to include feedback from reviewers and were expanded to include an explanatory background of the need.*

As a result of the Project Group's review of the raw workshop data, it became apparent that a mechanism for coordination of education activities and materials needed to be established. Although the theme of a central coordination mechanism for present and future environmental and occupational health professional education activities and materials was constantly endorsed, the structure for such a mechanism remained unclear. Subsequently, the concept of an Interagency Education Program Liaison Group (IEPLG) was defined by the Project Group along with its accompanying objectives, scope, and requirements. Additional recommendations that were selected from the workshop are listed in Section 3. These include curriculum, faculty, students, continuing education, and research.

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* Recommendations on Environmental and Occupational Education of Health Professionals is available as a separate document. See Appendix C.

Project Group on Exposure and Metabolic Mechanisms

The Project Group on Exposure and Metabolic Mechanisms was established by the Working Group in May 1979 to address the determination and quantification of exposure to environmental chemicals and the metabolic processes associated with chemically induced cancer and heart and lung diseases. This section summarizes the findings and conclusions in each of these areas. A detailed report on the activities of this Project Group is available as a separate document.*

Specific charges addressed during this year with respect to those diseases of interest to the Task Force are:

- To describe the importance of environmental pollution exposure and the related metabolic mechanisms with respect to known and potentially deleterious health effects
- To determine whether a chemical-by-chemical literature review and analysis is feasible to identify information voids and formulate additional research requirements
- To provide conclusions on needed research and strategies to the Working Group members for the development of recommendations.

To address these charges, it is important to know the interrelationships of exposure to a toxicant, body uptake, metabolism, and target organ(s) affected by the toxicant. Knowledge of mechanisms of toxicity and transformation will allow for prediction of health effects and understanding of disease etiology.

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* Report of the Project Group on Exposure and Metabolic Mechanisms, April 1980. See Appendix C.

As comprehensive data are accumulated and disseminated in these areas, health professionals and researchers can increase their ability to: (1) organize existing chemicals into probable disease-causing groups, (2) predict potential toxicity of new chemicals introduced into the environment each year, (3) detect symptoms associated with trace chemical levels in the body tissues and fluids of persons exposed to toxic substances, and (4) prevent and control the toxic effects of various environmental agents.

Specific activities conducted by the Project Group in relation to the charges included a report* by NIEHS of the feasibility of studying exposure and metabolic mechanisms on a chemical-by-chemical basis. While such an approach was not within the scope of the Project Group's efforts, the results of that study have been useful in developing general approaches and methodologies for subsequent activities.

During this year, the Project Group formulated preliminary conclusions for research requirements in exposure and metabolic mechanisms in the areas of:

- Well-planned, comprehensive exposure assessment studies
- Personal dosimetry designed to measure low-level air contaminants and particulates
- Population activity patterns

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* Piver, W.T., W. Jurgelski, T. Damstra, H.L. Falk, and J. Bernheim. Exposure and Metabolic Mechanisms of Four Important Industrial Pollutants: Benzene, Toluene, Carbon Disulfide and Methylene Chloride. Prepared for the Task Force on Environmental Cancer and Heart and Lung Disease. NIEHS, Research Triangle Park, North Carolina, December 1978.

- Animal models that most closely simulate humans
- Further definition of the pharmacokinetics of foreign compounds in animal models and the relation of these data to humans
- Improvement in initial screening of new chemicals using combinations of in vitro and in vivo systems
- Mechanisms of carcinogen/toxicant metabolism at the subcellular level
- Identification of additive, synergistic, and inhibitory interactions of pollutants
- Comprehensive multidisciplinary program that includes studies in toxicology, pharmacology, metabolism, and biochemistry.

Details of these conclusions are provided in Appendix E.

Before initial research recommendations are formulated, the Project Group chose to further validate these initial conclusions by determining the scope of current Federal research programs addressing these areas. Analysis of existing Task Force Agency programs, based on the preliminary document Report of the Program Inventory of Federal Research Programs of Relevance to the Task Force, identified current primary programs for comparison with the conclusions. This work is in progress.

The concept of an exposure data base directory formulated by the Project Group is being further developed as a Task Force core activity for information exchange. As described earlier in this section, the data base directory will be used as a summary to identify information voids in the research areas of interest to this Project Group.

At its most recent meeting, the Project Group identified additional research requirements in several areas including:

- Innovative approaches needed for good prospective and retrospective epidemiological studies
- Improvements needed in techniques used to measure exposure to pollutants and development of appropriate indoor and outdoor models for risk assessment
- Basic and applied research programs to study mechanisms of toxicity and malignant transformation.

Further details are provided in Appendix F.

The Project Group's continuing activities encompass: (1) verification that the preliminary conclusions are valid and appropriate for Task Force consideration, (2) synthesis of conclusions into initial action recommendations, and (3) development of research strategies and programs directed toward reducing the incidence of cancer and heart and lung diseases.

Project Group on Standardization of Measurements and Tests

The Project Group's concerns in data from measurements and tests result from the fundamental need for reliable, comparable data on environmental and disease parameters. During the past year, the Project Group on Standardization of Measurements and Tests has accumulated quality assurance literature in order to identify potential contributions to the state-of-the-art of environmental and occupational monitoring and testing that would complement, rather than duplicate or overlap, the efforts of individuals or Agencies concerned with this general area. The literature review to

date has been confined to Agency manuals or guideline documents and to articles appearing in technical journals such as Clinical Chemistry and Analytical Chemistry. Based on the literature review and experiences of Project Group members, attention has initially focused on the development of methods for improving and evaluating the quality and reliability of environmental and occupational monitoring data. In particular, the Project Group has identified two problem areas common to Task Force member Agencies:

- Since Agencies or laboratories charged with monitoring activities typically have limited resources, they need a sound basis for resource allocation to optimize the quality of their data. While guidelines for Good Laboratory Practices and Quality Control and Quality Assurance manuals have been developed for a variety of analytical methods, further research is needed to quantify the extent to which specific factors contribute to the ultimate quality of the data.

- Researchers using published environmental monitoring data currently have limited means of assessing the reliability and validity of such information. Given additional information, they could decide whether a data set should be used with confidence that its numbers are correct, used with caution, or used only for strictly defined purposes.

In response to the first problem area, the Project Group is currently engaged in a study to assess the feasibility of quantifying the relationships between the various quality control activities in the laboratory setting and the ultimate quality of the results that laboratories produce. For the initial phase of the study, a data base from the EPA Office of Pesticide Programs (OPP) is being used.

In the study, the quality of laboratory data is being quantified both from the results of semiannual performance evaluations conducted by

EPA/OPP and from laboratories' repeated analyses of Spiked Reference Materials (SPRMs) prepared by EPA/OPP. Based on the performance evaluations, each participating laboratory is assigned a score or rating that reflects the quality of its analyses for a particular substrate. The data from laboratories' repeated analyses of SPRMs are being used to make precision and accuracy estimates for each laboratory for selected substrates and to calculate the frequency with which various Quality Control (QC) limits were exceeded within each laboratory. Other quantifiable characteristics for laboratories include their size, their length of participation in the EPA/OPP interlaboratory testing program, the experience and training of their analysts, and their ratio of QC samples to routine samples for selected substrates.

Guidelines for the ratio of QC samples to routine samples have been prepared by several member Agencies for a variety of substrates, but need to be formulated on a more scientific basis. One anticipated output from this type of study is a stronger justification for the imposition of specific guidelines concerning QC/routine sample ratios to enable a more appropriate allocation of resources for this quality control activity.

In response to the second problem area, the Project Group has been considering the development of an index of data reliability. As initially conceived, such an index would reflect the following general types of factors and their weighting for a particular monitoring data set: sampling, internal quality control, external quality assurance, reliability of materials and methods, precision and accuracy, and blatant errors.

The two problem areas described previously are being dealt with by pursuing three distinct, yet related, phases of activity. The Project Group on Standardization of Measurements and Tests is working toward developing recommendations in the following areas:

- Pending an outcome of the ongoing feasibility study of factors affecting the quality of analytical results, similar study methods should be applied, using data bases from other Task Force member Agencies.
- A standard set of key parameters to be used in assessing the quality of monitoring data is being developed; further, the most effective means of incorporating this set of parameters will be determined.
- An index and associated scoring criteria, keyed to the above parameters, is being developed to quantify the reliability and validity of monitoring data sets; further, the indices should be validated through correlation with cases of known performance.

THE INITIAL PROCESS FOR DEVELOPMENT OF RECOMMENDATIONS

One of the major responsibilities of the Task Force includes the development of recommendations for a comprehensive research program. While the core and specific area activities described are intended to support and develop such recommendations (see for example the education recommendations in Section 3), the Task Force has determined that an overall scheme, directed toward systematic formulation of recommendations, should be developed.

An approach to such a scheme has been conceived and is now in the process of further development. The approach is described in detail in Appendix E, together with a first-stage effort using a variation on the initial recommendation.

The conceptual approach to this process is depicted in Figure 2. Information from current scientific understanding is combined with an understanding of Agency planning processes and of current research programs and resource utilization. Collation and integration of this information across a set of program categories provides a cross-Agency perspective not previously available. This combined information resource will be utilized by participating Agencies within the Task Force to collectively identify and stimulate increased effort in needed subject areas.

The scheme makes maximum use of work of contemporary expert recommendations and research planning processes, within and outside of the Federal Government (Figure 2). Also implied is the integration of output from other relevant Task Force activities. The operational steps that are being developed are described in Appendix E.

The outcome of the approach will focus on the following:

- Scientific subject areas needing increased effort
- Needed interagency cooperative and coordinative mechanisms
- Data systems and other such systems that support a broad range of research objectives among Federal Agencies.

To date this approach has been explored in several areas. The Program Inventory that is integral to it has been developed in its first stage and was used in a partial test of the scheme. The initial procedure is described in Appendix E; although it used only some of the proposed

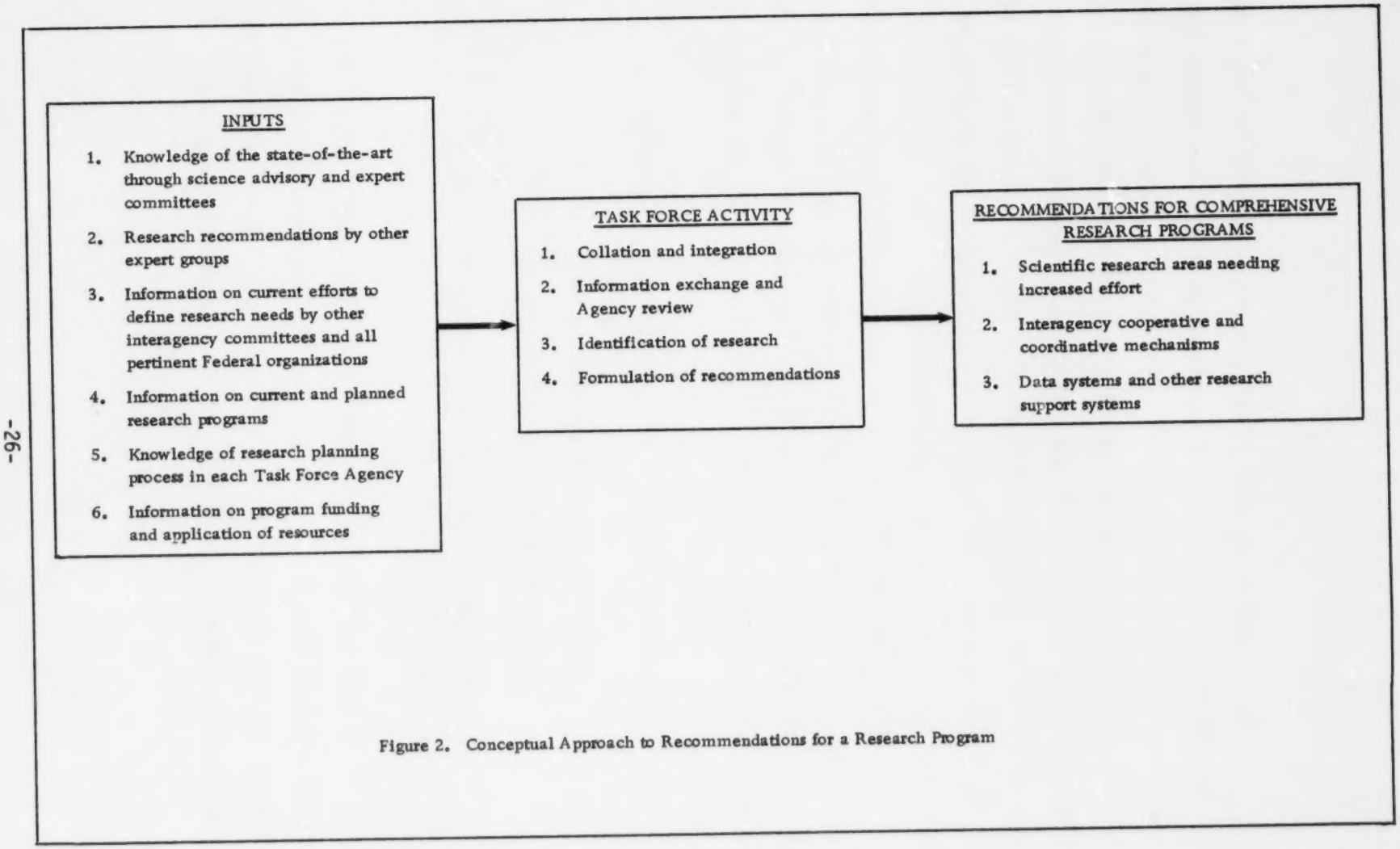
INPUTS
1. Knowledge of the state-of-the-art through science advisory and expert committees
2. Research recommendations by other expert groups
3. Information on current efforts to define research needs by other interagency committees and all pertinent Federal organizations
4. Information on current and planned research programs
5. Knowledge of research planning process in each Task Force Agency
6. Information on program funding and application of resources
TASK FORCE ACTIVITY
1. Collation and integration
2. Information exchange and Agency review
3. Identification of research
4. Formulation of recommendations
RECOMMENDATIONS FOR COMPREHENSIVE RESEARCH PROGRAMS
1. Scientific research areas needing increased effort
2. Interagency cooperative and coordinative mechanisms
3. Data systems and other research support systems

Figure 2. Conceptual Approach to Recommendations for a Research Program

steps and employed the first version of the Program Inventory, it did produce useful recommendations as given in Section 3. This gives further support to the pursuit of this scheme.

The Program Inventory will be refined and updated as described in Section 4 and Appendix D and will be used in future implementation of the scheme. In addition, areas that require and will be given attention include information on current efforts to define research needs by other interagency groups and pertinent Federal organizations, and on the research planning process in each Task Force Agency.

Section 3

SUMMARY OF RECOMMENDATIONS

Section 3

SUMMARY OF RECOMMENDATIONS

The recommendations in this year's annual report have evolved from two processes. One of these was the first-stage test using some aspects of the method for development of recommendations described at the end of Section 2 with details given in Appendix E. The program recommendations developed through the first-stage analysis are given below. These program recommendations are important in that research in the identified areas will be extremely important for quantification of the relationships between pollution and diseases. One limitation of this first-stage process is that the recommendations generated are not necessarily comprehensive. As indicated in the section on Task Force Plans (Section 4), this limitation will be addressed by the Task Force in the coming year. In addition, Recommendations 1 through 4 that were developed by this process will be elaborated on and developed further.

The second process involved development of a set of recommendations on education. These recommendations (Numbers 5 through 12, beginning on the next page) were developed by the Education Project Group from the findings of the education workshop. Further action on Number 5 is discussed within that recommendation. Numbers 6 through 12 involve additional funding, and the next stage in their development will consist of ranking them in order of priority.

INITIAL PROGRAM RECOMMENDATIONS

1. Multimedia Pollutant Exposure and Health Effects--Research on the relative contribution of various environmental media is needed in order to quantify more accurately the toxicological effects, the risk to human health, and to develop strategies for control of pollutants.

2. Transport and Fate of Pollutants in the Biosphere and Food Chain--Research efforts are needed on a comparative analysis of various residuals in air, water, soil, plant, animal, and human tissues. Further studies should evaluate how the pollutant is modified as it moves through the food chain. The development of rapid, inexpensive, and reliable methods for analyzing food contaminants and residuals in biological specimens also is needed.

3. Biological and Chemical Measurement Methodology and Data Analysis--Research on methodology of measurements and on data analysis is needed both to assist in the achievement of less expensive study designs and to improve the collection and evaluation of scientific data.

4. Pollutants in Ground and Surface Water Sources--Comprehensive research should be undertaken to identify the major pollutants in ground water and in surface water, their persistence and transport, and health effects.

EDUCATION PROGRAM RECOMMENDATIONS

5. Interagency Education Program Liaison Group (IEPLG)--Under the aegis of the Task Force, an IEPLG composed of those Federal Agencies that are involved in environmental and occupational health professional education should be established. The mission of this group will be to coordinate and stimulate Federal activities in the area of environmental and occupational health professional education in terms of curriculum, faculty, students, continuing education, and research. The IEPLG will coordinate and assist in implementation of recommendations developed by the Project Group. It will hold conferences and workshops whenever feasible and appropriate. Individuals from outside the Federal Government, including those representing professional societies and organizations, will be invited to participate. The IEPLG will report annually on its activities to the Task Force and to member Agencies on a quarterly basis.

   The following recommendations developed by the Project Group on Education are referred to the IEPLG for prioritization, coordination, and implementation:

   ### Curriculum

   A list of Government programs in environmental and occupational health professional education and training

by region should be assembled and disseminated to health professional institutions.

Cooperative relationships should be established and maintained with professional associations involved in environmental and occupational health, and with professional education institutions, to facilitate provision of teaching assistance, materials, and expertise in environmental health curriculum development.

Professional organizations and Federal Agencies interested in environmental and occupational health should work toward the education of medical and nursing students to take a thorough environmental and occupational history.

Health professional associations working with relevant educational institutions, industry and labor should establish onsite practical experience opportunities.

Appropriate Federal Agencies should encourage schools with ongoing programs to share their expertise with other developing institutions.

Educational outreach services are important and should be supported and strengthened.

Faculty

Health professional educational institutions should seek state funding and private funding from sources such as unions, industry, and foundations to create faculty chairs in environmental and occupational health.

Students

Necessary support for environmental and occupational health education and developed awareness of career opportunities in primary, secondary, and vocational schools, as well as for the professional preparation of teachers in these fields, should be sought through state and local departments of education.

Current endeavors in environmental and occupational health education should be coordinated among Government Agencies with similar missions. This should increase the availability of educational material in the field of environmental and occupational health and minimize overlap.

More students need to be recruited into the field of environmental and occupational health.

Health professional educational institutions with environmental and occupational health programs should work with industry and labor to establish fellowships to attract students into environmental and occupational health careers.

Continuing Education

Appropriate Federal Agencies should: (1) identify those Federal and private institutions/societies having a commitment to environmental and occupational health professional education, and (2) work with these organizations to develop a core requirement in environmental and occupational health for continuing education credit.

Professional societies and specialty groups should reinforce and, if possible, require continuing education hours in environmental and occupational health.

All professional organizations and Federal Agencies involved in environmental and occupational health should promote the continuing education of practicing physicians and nurses to take a thorough environmental and occupational patient history.

Appropriate Federal Agencies should take the lead in developing improved materials for diagnosis and clinical management of environment- and occupation-related disease (especially for primary care physicians).

6. Curricular Models--Appropriate Federal Agencies should receive necessary support to stimulate development of curricular models in environmental and occupational health and encourage their dissemination and use by those schools with little or no current environmental and occupational health instruction, occupational historytaking, environmental disease diagnosis and treatment, and other relevant areas.

7. Curriculum Development Programs--Appropriate Federal Agencies should provide necessary funding for developmental programs in environmental and occupational health education.

8. Faculty Development--The federally funded faculty development grant program in environmental and occupational health should be adequately supported.

9. Postdoctoral Training--Appropriate Federal Agencies should provide necessary funding for postdoctoral training grants to encourage health professionals to choose careers in environmental and occupational health research, education, and practice.

10. Undergraduate Training--Federal and state Governments should be encouraged to use grants as a method of attracting undergraduate students into the field of environmental and occupational health.

11. Health Professional Placement--The efforts should be made to expand the criteria for placing National Health Service Corps personnel to include those geographic areas where environmental and occupational health hazards are a significant problem and where unusually high needs for primary medical care services also exist.

12. Research--Provide necessary support for research on:

    Interdisciplinary team approaches (e.g., physicians, nurses, industrial hygienists, physician assistants, epidemiologists, etc.) to environmental and occupational health.

    Educational methods and techniques for improving curriculum development, implementation, dissemination, and evaluation in the field of environmental and occupational health.

Section 4

PLANS FOR CONTINUED WORK

Section 4

PLANS FOR CONTINUED WORK

The plans for the coming year consist of continued expansion of ongoing core and specific area activities.

CORE ACTIVITIES

The Task Force will begin its fourth year of work with plans in the following areas:

- Information Exchange
- Program Inventory
- Risk Assessment
- Costs of Environment-Related Disease.

A brief presentation for each of these activities follows.

Information Exchange

Information exchange and liaison with pertinent groups will continue to characterize the efforts of the Task Force during the coming year. Planned information exchange activities include: an assessment of Federal information resources, an assessment of relevant data bases, a pilot study on tracking research information, and development of an exposure data base directory.

Needs relating to coordination, accessibility, and availability of informational resources pertaining to the Task Force's areas of concern will be identified. One important Agency activity, which should be adequately supported, is the NCHS development of guidelines and a clearinghouse for environmental health statistics under Public Law 95-623.

First, an identification and assessment of Federal information resources, including committees, resource and referral centers, and clearinghouses that coordinate, produce, or use computerized data of interest to the Task Force is planned. These resources will be studied with reference to coordination, availability, and accessibility, to better understand the information needs in scientific areas relevant to the scope of the Task Force.

Indepth analyses of individual data bases will be done, if it is deemed necessary and useful, in order to produce a directory and a report of the analyses in terms of Task Force informational needs. The analyses would be directed toward determining the alternatives for a data base referral system, with indexed terms and qualitative data, and recommendations as to its implementation.

As another information exchange activity, a pilot study to track research information will be performed in an attempt to relate funded programs or projects to their various interim and final products and publications. Information in the Program Inventory will be expanded and used as a mechanism for the study and appraisal of related Task Force Agency research activities.

The exposure data base directory is a joint activity of information exchange efforts and the Project Group on Exposure and Metabolic Mechanisms. The initial directory is listed in Appendix C. Additional data bases are being identified, researched, and documented.

Program Inventory

The Program Inventory will be further developed and regularly updated for Task Force use to provide the Task Force Agencies with comprehensive information on research programs. The first inventory of Task Force member programs was an indication of Agency efforts at a level of detail adequate to permit its use for general analyses. For example, this inventory has been used to develop the initial program recommendations presented in Section 3. In the revised inventory, information will be provided at the program and subprogram levels in response to an improved questionnaire. Personal interviews with appropriate Agency representatives will be conducted where problems arise with completion of the questionnaire or if clarification is needed. The programs to be included will continue to be defined in terms of 15 categories.*

In order to further refine and update the inventory, the following measures will be instituted:

- To eliminate duplication of information between categories, Agencies will be asked to categorize their programs into a specific category per program similar to the approach used by NIEHS for the first inventory.
- Personal contact will be made with Agency representatives to clarify any difficulties with filling out the questionnaire.
- Revisions will be made to the questionnaire to reflect ongoing programs in diet and nutrition with respect to chemically related diseases of concern to the Task Force.

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* See Appendix D for category definitions.

- Revisions will be made to identify cooperative interagency programs.

- The mailing of questionnaires to the Agency program representatives will be timed, if possible, to coincide with their annual budget report for maximum efficiency of their time.

- Agency budget documents will be analyzed and cross-referenced with the questionnaires to substantiate that all appropriate programs have been included.

Risk Assessment

The Task Force will continue monitoring and tracking activities to maintain awareness of these Federal Agencies that have responsibilities in environmental health, and with Federal interagency groups and other organizations whose work includes environmental health components. The objectives of this continuing liaison will be to keep the Task Force informed of risk assessment activities, and to summarize this progress in ways useful both to the Task Force Agencies and in Task Force deliberations.

As a second planned activity in risk assessment, indepth investigations of special topics in risk assessment that will be useful to the Task Force Agencies and in Task Force deliberations will be continued. The topics that are being considered include:

- A summary of the OSHA findings on the scientific bases for risk assessment contained in the OSHA regulations published in January 1980.

- A review of the scientific literature on key topics in risk assessment of overall relevance to Task Force activities.

Costs of Environment-Related Disease

The Task Force needs in health costs of environment-related diseases will be identified. The Task Force will continue to work with the NAS/IOM Planning Committee for the Ongoing Study of Costs and Environment-Related Health Effects and the NCAQ. The liaison activities will permit the Task Force to be informed of the progress and results of these groups. Similarly, these and other groups with relevant scope will be appraised of Task Force needs and interests in environmental health costs. In addition the activity of reviewing and reporting on ongoing studies, as described in Section 2, will be continued.

SPECIFIC AREA ACTIVITIES

Project Group on Education of the Public and of Health Professionals

The future activities of the Project Group on Education of the Public and of Health Professionals will focus on two major areas: (1) followup of the health professional education workshop, and (2) investigation of the status of and the requirements for general public and worker health education. These two areas will be addressed concurrently in the coming year.

A major recommendation involving health professional education calls for the establishment of the IEPLG under the aegis of the Task Force. The Project Group plans to work closely with the Task Force to initiate and establish this group.

The initial focus of the IEPLG will be on promoting cooperation among Federal activities in environmental and occupational education of health professionals. However, upon the documentation of sufficient interest

and need, the interagency group may ask the Task Force to expand its membership and invite those professional societies and organizations that support and encourage environmental and occupational health professional education to participate. In this manner, a consortium of Federal Agencies and private organizations could be formed to provide a coordinated approach to all health professional education efforts in environmental and occupational health as it concerns those diseases of interest to the Task Force. In addition, the establishment of a resource center for educational information for professionals in environmental health will be pursued.

Concurrent with the followup activities directed at the health professional community, the Project Group plans to address the second half of its charge--the public. At its inception, the Project Group defined the public as representing two broad categories: the general public and the worker. Based on preliminary findings of public education efforts, the Project Group is initiating an assessment of environmental education efforts for the general public. Several sources previously contacted will again be tapped for this assessment. These include Federal and state Agencies and committees, professional and technical associations, voluntary associations, public interest groups, citizens' and lobby organizations, and news media.

The Project Group's plans for addressing educational needs of the worker with respect to occupational hazards are similar to those outlined for the general public. Initial data collection efforts in this area are centered on the identification of Federal initiatives. Future activities involve expansion of the data-collection effort to include contact with unions, trade associations, industry and labor representatives, insurance carriers,

educational institutions, as well as an update of Federal, state, and local government activities. The results of the data-collection efforts for both the worker and the general public will quantify the need for a national workshop tentatively set for Spring 1981.

Based on the findings of the planned data collection and analysis activities, the Project Group will confer with the IEPLG to consider the feasibility of expanding its scope to incorporate public education.

Project Group on Exposure and Metabolic Mechanisms

This Project Group will continue its ongoing activities and proceed with the formulation and development of recommendations during the coming year. Some of the specific tasks to be accomplished are:

- Continue to maintain liaison with and transfer information between this Project Group and various organizations and interagency groups with interests in exposure to environmental pollutants, their metabolism, and subsequent health effects.
- Refine research requirements presented in Appendix F and continue development of research strategies based on discussions at Project Group meetings, reports of other previous efforts such as NIEHS and Pennsylvania State University/Environmental Protection Agency (PSU/EPA) and contacts with other scientists in the areas of concern.
- Utilize the updated and improved inventory of Task Force research programs to determine which research needs identified by the Project Group are being addressed by Agencies and by cooperative arrangements between Agencies.
- Prepare recommendations to be presented to the Working Group in early 1981.

Plans are being discussed for a workshop that will provide expertise to set priorities among the most significant research needs dealing with the multifactorial etiologies of environmental cancer and heart and lung diseases.

Project Group on Standardization of Measurements and Tests

The future plans for the Project Group on Standardization of Measurements and Tests are to analyze the EPA/OPP data base and present these findings. Based on this, additional studies for validation purposes will be performed if deemed necessary. The Project Group also will review Agency efforts to construct data reliability indices for their particular needs and attempt to define a more comprehensive index that is consistent with such needs, as well as the needs of individual researchers. Concurrently, the most effective means of incorporating index parameters in monitoring/testing data sets will be sought.

ADDITIONAL PLANNED ACTIVITIES

Development of Recommendations

As initially presented in Section 2, the procedure used to develop recommendations will be refined to improve its feasibility and utility. Use of recommendations from other planning groups will continue to be incorporated in the Task Force's identification of research needs. Some examples of output of these planning groups include:

- Human Health and the Environment: Some Research Needs, Report of the Second Task Force for Research Planning in Environmental Health Sciences, National Institute of Environmental Health Sciences, DHEW Publication No. NIH 77-1277, 1976. 528 pp.

- Mayers, S.P., Cooperative Agreement for the Evaluation of Current Environmental Research and Establishment of Priorities, The Pennsylvania State University and the U.S. Environmental Protection Agency, University Park, Pennsylvania and Washington, D.C., 1979. 347 pp.

- Report: National Heart, Lung, and Blood Institute: Working Group on Heart Disease Epidemiology, U.S. Department of Health, Education, and Welfare, NIH Publication No. 79-1667, 1979. 78 pp.

An interaction between the Task Force and Agency planning staffs will support the Task Force's efforts in the development of recommendations. The primary objective of this interaction will be to facilitate the exchange of ideas and information among the research planning staffs of the Task Force Agencies. This will involve identifying the appropriate groups, determining a productive mechanism for accomplishing the exchange, implementation of the procedure, and promulgation of the results.

Coordination

Appropriate interagency committees will be selected for coordination to make previous ad hoc efforts of the Task Force more explicit and systematic in order to implement the general requirement for coordination as specified in Section 402 (b)(4) of the Task Force's enabling legislation. This will involve the selection of interagency groups, Task Force Agencies and other Agencies with which more explicit coordination will be useful in meeting the Task Force mandate. The mechanisms for coordination will be developed and proposed to the specific Agency or interagency group for approval and subsequent implementation. The interagency groups include: IRLG, NTP, CEQ, NCAQ, FICE

Subcommittee on Environmental Education, NAS/IOM Planning Committee for the Ongoing Study of Costs of Environment-Related Health Effects, NCVHS Subcommittee on Environmental Health Statistics, CCERP, and ICGEC.

Overall Strategy

Some categories, selected from the initial funding categories,* related to prevention and reduction of risk of environment-related diseases have not yet been explicitly addressed by the Task Force. These will be assessed and incorporated into the Task Force's activities in the fourth year. Categories 11 and 14, disease costs and education, respectively, have already been considered; the former because it was developed in the initial phase of recommendations and the latter because its critical importance was recognized at the onset and is being considered by the Project Group on Education of the Public and of Health Professionals. Categories 12, 13, and 15 will be addressed in the coming year because they are necessary to strategy planning and measures relative to the reduction of the risk and incidence of the diseases of Task Force concern.

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* The categories related to prevention and reduction of risk of environment-related disease include: (11) disease costs, (12) estimation of costs of control and prevention, (13) preventive health measures, (14) education, and (15) pollution control measures.

Appendix A

PERTINENT SECTIONS OF PUBLIC LAWS 95-95 AND 95-623

Appendix A

PERTINENT SECTIONS OF PUBLIC LAWS 95-95 AND 95-623

PUBLIC LAW 95-95

Clean Air Act Amendments of 1977

"INTERAGENCY COOPERATION ON PREVENTION OF ENVIRONMENTAL CANCER AND HEART AND LUNG DISEASE

Sec. 402. (a) Not later than three months after the date of enactment of this section, there shall be established a Task Force on Environmental Cancer and Heart and Lung Disease (hereinafter referred to as the 'Task Force'). The Task Force shall include representatives of the Environmental Protection Agency, the National Cancer Institute, the National Heart, Lung, and Blood Institute, the National Institute [for] Occupational Safety and Health, and the National Institute [of] Environmental Health Sciences, and shall be chaired by the Administrator (or his delegate).

(b) The Task Force shall--

(1) recommend a comprehensive research program to determine and quantify the relationship between environmental pollution and human cancer and heart and lung disease;

(2) recommend comprehensiye strategies to reduce or eliminate the risks of cancer or such other diseases associated with environmental pollution;

(3) recommend research and such other measures as may be appropriate to prevent or reduce the incidence of environmentally related cancer and heart and lung diseases;

(4) coordinate research by, and stimulate cooperation between, the Environmental Protection Agency, the Department of Health, Education, and Welfare, and such other agencies as may be appropriate to prevent environmentally related cancer and heart and lung diseases; and

(5) report to Congress, not later than one year after the date of enactment of this section and annually thereafter, on the problems and progress in carrying out this section."

PUBLIC LAW 95-623

Health Services Research, Health Statistics, and Health Care Technology Act of 1978

"INFORMATION ON EFFECTS ON HEALTH OF THE ENVIRONMENT AND EMPLOYMENT CONDITIONS

Sec. 8. (a) Section 306 (as amended by section 5) is amended by inserting after subsection (k) the following new subsection:
'(1) (1) The Secretary, acting through the Center, shall develop a plan for the collection and coordination of statistical and epidemiological data on the effects of the environment on health. Such plan shall include a review of the data now available on health effects, deficiencies in such data, and methods by which existing data deficiencies can be corrected. The Secretary shall submit such plan to the Congress not later than January 1, 1980.
'(2) (A) The Secretary, acting through the Center, shall establish, not later than two years after the date of the enactment of this subsection, guidelines for the collection, compilation, analysis, publication, and distribution of statistics and information necessary for determining the effects of conditions of employment and indoor and outdoor environmental conditions on the public health . . . .

. . . '(D) The Center shall serve as a clearinghouse for statistics and information with respect to which guidelines have been established under subparagraph (A) and shall assist executive departments in obtaining such statistics and information for purposes of administering laws under their jurisdiction relating to environmental health protection or the safety and health of employees . . . .
. . . (3) The Secretary, acting through the Center, shall conduct a study of the issues respecting, and the recommendations for, establishing a Federal system to assist, in a manner designed to avoid invasion of personal privacy, Federal, State, and other entities in locating individuals who have been or may have been exposed to hazardous substances to determine the effect on their health of such exposure and to assist them in obtaining appropriate medical care and treatment . . . .

. . . '(4) In carrying out paragraphs (1), (2), and (3), the Secretary shall consult with and take into consideration any recommendations of the Task Force on Environmental Cancer and Heart and Lung Disease . . . .

"TASK FORCE ON ENVIRONMENTAL CANCER AND HEART AND LUNG DISEASE

Sec. 9. The Director of the National Center for Health Statistics and the head of the Center for Disease Control (or the successor to such entity) shall each serve as members of the Task Force on Environmental Cancer and Heart and Lung Disease established under section 402 of Public Law 95-95."

Appendix B

MEMBERS OF THE TASK FORCE, WORKING GROUP, AND PROJECT GROUPS

Appendix B

MEMBERS OF THE TASK FORCE, WORKING GROUP, AND PROJECT GROUPS

TASK FORCE

EPA	Douglas M. Costle, Administrator	Chairman
	Stephen J. Gage, Assistant Administrator for Research and Development	Alternate
	Vilma R. Hunt, Deputy Assistant Administrator, Office of Health Research	Working Group Chairman
NCI	Vincent T. DeVita, Director	
	Herman F. Kraybill, Scientific Coordinator for Environmental Cancer, Division of Cancer Cause and Prevention	
NHLBI	Robert I. Levy, Director	
	Claude J.M. Lenfant, Director, Division of Lung Diseases	
	Manning Feinleib, Associate Director for Epidemiology and Biometry, Division of Heart Diseases	
NIOSH	Anthony Robbins, Director	
	Ralph E. Yodaiken, Medical Science Advisor, Office of Extramural Coordination and Special Projects	
NIEHS	David P. Rall, Director	
	Raymond E. Shapiro, Assistant Director for Toxicology Coordination	
CDC	William H. Foege, Director	
	Clark W. Heath, Director, Chronic Disease Division	
NCHS	Dorothy P. Rice, Director	
	Rosalie A. Dunn, Epidemiology Branch, Office of Statistical Research	
	Sam C. Marcus, Special Assistant to the Director	
FDA	Jere E. Goyan, Commissioner	
	Joseph V. Rodricks, Deputy Associate Commissioner for Health Affairs (Science)	

WORKING GROUP

EPA	Vilma R. Hunt, Deputy Assistant Administrator, Office of Health Research	Chairman
	George R. Simon, Science Review Administrator for Health Research, Office of Research and Development	
	Robert B. Medz, Senior Program Advisor, Office of Monitoring and Technical Support	
NCI	Herman F. Kraybill, Scientific Coordinator for Environmental Cancer, Division of Cancer Cause and Prevention	
	John I. Munn, Assistant to Scientific Coordinator, Division of Cancer Cause and Prevention (retired 3/28/80)	
	Morris I. Kelsey, Assistant to Scientific Coordinator, Division of Cancer Cause and Prevention	
NIEHS	Raymond E. Shapiro, Assistant Director for Toxicology Coordination	
NIOSH	Ralph E. Yodaiken, Medical Science Advisor, Office of Extramural Coordination and Special Projects	
	William A. Felsing, Deputy Director, Office of Extramural Coordination and Special Projects	
NHLBI	Claude J.M. Lenfant, Director, Division of Lung Diseases	
	Hugh B. Stamper, Division of Lung Diseases, Interstitial Lung Diseases Branch	
	Sydney Parker, Psychologist, Division of Lung Diseases, Prevention, Education and Manpower Branch	
	Manning Feinleib, Associate Director for Epidemiology and Biometry, Division of Heart and Vascular Diseases	
	A. Richey Sharrett, Medical Officer, Division of Heart and Vascular Diseases, Epidemiology Branch	
CDC	Clark W. Heath, Director, Chronic Disease Division	
NCHS	Rosalie A. Dunn, Epidemiology Branch, Office of Statistical Research	
	Sam C. Marcus, Special Assistant to the Director	

(Continued)

WORKING GROUP (Concluded)

FDA	Joseph V. Rodricks, Deputy Associate Commissioner for Health Affairs (Science)	
	Constantine Zervos, Director, Scientific Liaison Staff	
	Lois Ann Beaver, Staff Science Advisor	

PROJECT GROUPS

Education of the Public and of Health Professionals

NIOSH	Ralph E. Yodaiken, Medical Science Advisor, Office of Extramural Coordination and Special Projects	Chairman
	P.G. Rentos, Training Grant Program Officer, Division of Training and Manpower Development	
	Marsha Bernard, Occupational Health Nurse Educator, Division of Training and Manpower Development	
EPA	George R. Simon, Science Review Administrator for Health Research, Office of Research and Development	
	Karen Morehouse, Environmental Protection Specialist, Office of Noise Abatement and Control	
NCI	Margaret H. Sloan, Special Assistant for Liaison Activities, Division of Cancer Control and Rehabilitation	
NIEHS	Wilford L. Nusser, Associate Director for Extramural Programs	
NCHS	Jeffery Perlman, Chief Medical Officer, Division of Health Examination Statistics	
NHLBI	Daniel J. Rubin, Chief, Program Planning and Evaluation Branch, Office of Program Planning and Evaluation	
	Sydney Parker, Psychologist, Division of Lung Diseases, Prevention, Education and Manpower Branch	
DOL	Edward J. Bergin, Program Analyst, Office of the Assistant Secretary for Policy, Evaluation and Research	

(Continued)

PROJECT GROUPS (Continued)

Education of the Public and of Health Professionals (Concluded)

OSHA	Earl D. Heath, Director, Office of Training and Education	
ED	Walter J. Bogan, Director, Office of Environmental Education	
HRA	William J. Holland, Deputy Chief, Education Development Branch; Chief, Program Development Section, Division of Associated Health Professions, Bureau of Health Professions Louis Steinberg, Chief, Educational Development Report Section, Educational Development and International Activities Branch, Division of Medicine, Bureau of Health Professions Max Lum, Medical Education Specialist, Division of Medicine, Bureau of Health Professions Nancy J. Story, Program Analyst, Division of Medicine, Bureau of Health Professions	

Standardization of Measurements and Tests

EPA	Robert B. Medz, Senior Program Advisor, Office of Monitoring and Technical Support	Chairman
NIAMDD	Cyrus Creveling, Laboratory of Bioorganic Chemistry	
NIOSH	Judd Posner, Robert A. Taft Laboratories	
NIEHS	Phillip Albro, Environmental Chemistry Branch	
CDC	David D. Bayse, Clinical Chemical Division	
FDA	Constantine Zervos, Director, Scientific Liaison Staff Lois Ann Beaver, Staff Science Advisor	

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PROJECT GROUPS (Continued)

Exposure and Metabolic Mechanisms

NCI	John I. Munn, Assistant to Scientific Coordinator, Division of Cancer Cause and Prevention	Chairman (retired 3/28/80)
	Herman F. Kraybill, Scientific Coordinator for Environmental Cancer, Division of Cancer Cause and Prevention	Chairman (3/28/80-6/12/80)
	Morris I. Kelsey, Assistant to Scientific Coordinator, Division of Cancer Cause and Prevention	Chairman (6/12/80-present)
	Elizabeth K. Weisburger, Chief, Laboratory of Carcinogen Metabolism	
	Thomas J. Mason, Chief, Population Study Section, Environmental Epidemiology	
	Ted E. Gram, Head, Drug Interaction Section	
FDA	Tim Henry, Staff Science Advisor, Office of Health Affairs	
	Ronald W. Hart, Director, National Center for Toxicological Research	
NIOSH	Richard W. Niemeier, Section Chief, Acute and Subchronic Toxicology Section, Division of Biomedical and Behavioral Sciences	
	Harry B. Plotnick, Section Chief, Mechanics of Industrial Disease, Division of Biomedical and Behavioral Sciences	
	Pervis C. Major, Chief, Immunology Section, Division of Respiratory Disease Studies	
EPA	Lance Wallace, Environmental Scientist, Office of Monitoring Technology Support	
	Frode Ulvedal, Supervisory Toxicologist, Office of Health Research	
NIEHS	Larry G. Hart, Assistant to the Director	
NCHS	Sam C. Marcus, Special Assistant to the Director	
CDC	Jean French, Health Scientist, Chronic Disease Division	
	Clark W. Heath, Director, Chronic Disease Division	

(Continued)

PROJECT GROUPS (Concluded)

Exposure and Metabolic Mechanisms (Concluded)

NHLBI	James Gillette, Chief, Laboratory of Chemical Pharmacology Daniel J. Rubin, Chief, Program Planning and Evaluation Branch
USDA	John E. Spaulding, Director, Residue Evaluation and Surveillance Division, Food Safety and Quality Service

Appendix C

LIST OF PUBLICATIONS ORIGINATING FROM THE TASK FORCE ON ENVIRONMENTAL CANCER AND HEART AND LUNG DISEASE, 1978-1980

Appendix C

LIST OF PUBLICATIONS* ORIGINATING
FROM THE
TASK FORCE ON ENVIRONMENTAL
CANCER AND HEART AND LUNG DISEASE,
1978-1980

First Annual Report to Congress by the Task Force on Environmental Cancer and Heart and Lung Disease, August 7, 1978

In this first report to Congress, the Task Force summarized the problem of environmental cancer and heart and lung diseases as an interagency/interdisciplinary issue that faced the Nation as of 1978. The Task Force subsequently identified six important areas of research in which early interagency cooperation could address these issues. These research areas are: standardization of measurements and tests, exposure and metabolic mechanisms for pollutants, early indicators of disease, risk assessment, education of the public and of health professionals, and strategies to protect public health.

Environmental Pollution and Cancer and Heart and Lung Diseases, Second Annual Report to Congress, August 7, 1979

In the Task Force report to Congress on its second year of work, the following progress was indicated and described. Project Groups were formed on Standardization of Measurements and Tests, Education of the Public and of Health Professionals, and Exposure and Metabolic Mechanisms. Information exchange among member Agencies of the Task Force was considered the primary basis for establishing coordination and development of interagency programs. Funding was identified and classified in each Task Force member Agency. Approximately $270 million was spent in 1978 by the seven Agencies on research and strategy planning addressed to Task Force objectives.

Report of the Inventory of Federal Research Programs of Relevance to the Task Force, April 1980

This initial inventory is a compilation of research program information from Task Force member Agencies in a common format for 115 research programs. Details pertaining to each research program are given to facilitate

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* Limited copies of these publications are available and can be obtained by contacting Dr. N.L. Nagda, GEOMET, Incorporated, 15 Firstfield Road, Gaithersburg, Maryland, 20760.

general coordination. Summary information on program description, resources applied, person-year effort, objectives and mandated responsibilities, activities, and future research and resource needs is included. The limitations of the inventory are given in Section 2, page 9. This inventory will be revised during Fall 1980.

Summary of the Workshop on Environmental Education Needs of Health Professionals, December 1979

Held by the Project Group on Education of the Public and of Health Professionals, this 2-day workshop identified the needs of health professionals in environmental education. To meet these needs, the workshop participants developed action plans that were aimed at increasing health professional capability in effective prevention of environment-related disease. Workshop participants included representatives from health professional organizations, labor unions, and concerned Federal Agencies. The purpose of this document is to report on the activities of the Project Group before, during, and since the October 1979 workshop; to publish the methodology and summary of the workshop; and to outline the type of recommendations expected to result from the workshop output.

Recommendations on Environmental and Occupational Education of Health Professionals, Project Group on Education of the Public and of Health Professionals, Ralph E. Yodaiken, Chairman, April 1980

The recommendations that resulted from a 2-day workshop on the environmental education needs of health professionals are presented in this document. These recommendations outline a strategy through which health professionals can be more effective in the prevention of environment-related diseases. Included in the strategy are the establishment of an Interagency Education Program Liaison Group and specific recommendations addressing curriculum, faculty, students, continuing education, and research components.

A Comparison of Scientific and Procedural Bases Used by Federal Agencies for the Regulation of Carcinogens, February 13, 1980

This document is intended as an initial attempt to begin summarizing the risk assessment activities currently being conducted by Federal Agencies, interagency groups, scientific panels, and private groups in the field. A comparison of the scientific and procedural bases used by Federal Agencies for regulating carcinogenic substances is presented.

Directory of Federal Interagency Groups Concerned with Environmental Health, October 1979 and April 1980

First edition: October 1979. The document was compiled to enhance the availability of knowledge on environmental health. Information on 24 committees is included. The first edition, which is out of print, has been superseded by a second edition.

Second edition: April 1980. This edition updates and expands the information that was presented in the first edition. The second edition includes information on 33 interagency committees and their subcommittees or components that deal with environmental health. Designed as a reference tool to locate interagency committees and their components, the directory is intended to promote coordination and information exchange among the listed groups and the Agencies and institutions involved in identifying problems and initiating research in environment-related cancer and heart and lung disease.

Calendar, Monthly Issue

The Calendar was initiated in June 1979 and is distributed monthly to facilitate information dissemination within a 3-month time frame. The Calendar includes announcements of meetings, conferences, symposia, short courses, public hearings, and workshops that pertain to environmental pollution and disease.

Directory of Exposure-Related Data Bases, In Preparation

This directory will be one part of a comprehensive effort by the Task Force to examine and assess the availability and completeness of existing information resources related to exposure assessment. Data base characteristic tables are included to aid the user when locating the most appropriate data base(s) for a particular use. A description of the scope, quality of the data, format, and accessibility is included for each data base that is listed.

Report of the Project Group on Exposure and Metabolic Mechanisms, April 1980

This report is a synthesis of discussions, ideas, literature searches, and proposed approaches for continuing activities of the Project Group. The Group's overall efforts are directed at establishing a mechanism to achieve interagency cooperation and developing recommendations for needed research in relating exposure to environmental pollutants, their human intake, toxicity, and metabolic fate. The Project Group enumerated nine areas where empirical research should continue.

Appendix D

TWO KEY CORE ACTIVITIES OF THE TASK FORCE

Appendix D

TWO KEY CORE ACTIVITIES OF THE TASK FORCE

PROGRAM INVENTORY DEVELOPMENT

This appendix summarizes two core activities of Task Force work: Program Inventory development and risk assessment.

An integral component to the overall approach for the development of recommendations is information on the current research programs of member Agencies. A preliminary listing and description of the research programs that are relevant to the Task Force's objectives was completed during the Task Force's third year.

To develop a computer file of these data, information was collected on each relevant research program from individuals in each Agency who were coordinators or were otherwise closely associated with the research programs. The sample form on the following 2 pages was completed for each identified program. The entries, descriptive titles, and instructions on the form show the kinds of summary information that were requested.

Three criteria guided the development of the inventory form and the overall inventory approach. These criteria were simplicity, flexibility, and comprehensiveness. The first criterion, simplicity, was considered essential, at least for this initial inventory of research programs for eight Federal Agencies. In planning the approach for the inventory, the program information for an Agency was presented at a level at which information is readily available. Substantial additional efforts should not be required.

SAMPLE FORM

Agency _____ Program Level _____

Program _____

Program Coordinator _____ Prepared By _____

TASK FORCE ON ENVIRONMENTAL CANCER AND HEART AND LUNG DISEASE
DESCRIPTION FOR INVENTORY OF AGENCY PROGRAMS

I. Please provide in the spaces indicated below a brief description of the FY80 activities within your program as they relate to the Task Force on Environmental Cancer and Heart and Lung Disease.

Resources Applied:

$(K) _____ Person-Years _____

Special Equipment/Facilities _____

Objectives and Mandated Responsibilities:

Activities:

Program _____

Activities (continued):

Future Research and Resource Needs (optional):

II. For each parameter listed below, please check the boxes which best characterize typical research efforts being undertaken by your program:

A. Class of Pollutant:
- ☐ Chemicals _____
- ☐ Group(s) of Chemical _____
- ☐ Nonspecific _____

B. Route of Exposure:
- ☐ Air ☐ Water ☐ Soil ☐ Multimedia
- ☐ Nonspecific

C. Population Groups at Risk:
- ☐ General population _____ ☐ Occupational _____
- ☐ High risk population _____ ☐ Other _____
- ☐ Nonspecific _____

D. Disease Endpoints:
- ☐ Cancer _____ ☐ Heart Disease _____
- ☐ Lung Disease _____ ☐ Norspecific _____

Circle one parameter (A, B, C, or D) which most closely characterizes the orientation of your program.

III. Please identify all categories applicable to your program (see attachment) (optional)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9
☐ 10 ☐ 11 ☐ 12 ☐ 13 ☐ 14 ☐ 15

Circle one or two (but no more than two) categories which represent the primary area of emphasis on your program

Date Completed _____

The second criterion, flexibility, was adopted because of the diversity of orientation and activity among the different Agencies. Each Agency has its own mandates and philosophy; each approaches the Task Force with its own needs in mind. The 2-page form used in this initial inventory was open ended, so each program entry from an Agency could include any unique characteristics.

The third criterion was comprehensiveness. An extensive description of all program areas relevant to the mission of the Task Force from all eight Agencies was sought. Each Agency was encouraged to include information on all applicable research programs.

Data Collection and Results

Work on the data collection phase of the Program Inventory began in September 1979. The initial approach was to begin data collection with EPA. From these preliminary efforts at EPA, the approach was refined before application in the seven remaining Agencies. Program coordinators were identified through each Agency's Task Force representatives. A package of information describing the purposes of the inventory was sent to each coordinator. Subsequent meetings were held to answer questions and to expedite completing the forms. Data collection was complete by January 1980 and the preliminary report was concluded in March 1980.

The preliminary Program Inventory now includes a compilation of 115 forms representing relevant research programs for all eight Task Force member Agencies. The results of synthesizing the information included in the input forms are presented in four summary tables in the complete report. In

the first table, each entry is presented by the 15 funding categories, which are described on pages D-8 through D-11. The programs are grouped by Agency with a descriptive program title to characterize each of the programs. A primary entry (x) indicated the major research parameters; secondary designators (o) gave research classification areas. However, a review of the indicated primary and secondary parameters identified considerable variability, both within and among Agencies, as to the number of categories that were checked as primary or secondary. Additional difficulties were encountered as described in the main text, and will be addressed in the updating and revision process.

The second table presents each of the program entries by class of pollutant, route of exposure, population groups at risk, and disease endpoints. The third table (presented here in summary form as Table D-1) displays the Agency programs using the 15 possible categories of activities as rows and four disease endpoints--cancer, heart disease, lung disease, and nonspecific--as columns to create a 15 x 4 matrix with 60 cells. This table includes both secondary and primary entries. The fourth table is identical to this except only primary categories were used to prepare the matrix.

The Program Inventory will be refined and updated in the Task Force's fourth year. The next inventory will benefit from the developmental inventory in that the quality of the data will be perfected and the limitations of the initial inventory will be addressed and solved.

Table D-1. Summary of Task Force Programs by Categories and Disease*

Category and Title	Numbers of Research Programs in Each Agency and for Each Disease*			
	Cancer	Heart Disease	Lung Disease	Nonspecific
1. Determination of Biological Effects and Dose-Response Relationships	EPA 8 NCHS 1 CDC 3 NIOSH 4 FDA 3 NIEHS 2 NCI 1	EPA 5 NCHS 1 CDC 1 NIOSH 2 FDA 2 NIEHS 1 NCI 1	EPA 5 NCHS 1 NHLBI 3 CDC 3 NIOSH 3 NIEHS 2 NCI 1	EPA 6 CDC 2 NIOSH 2 NIEHS 1
2. Understanding Mechanism or Mode of Biological Effects	EPA 7 CDC 2 NIOSH 4 FDA 3 NIEHS 2 NCI 4	EPA 5 NHLBI 2 NIOSH 2 FDA 2 NIEHS 2 NCI 1	EPA 5 NHLBI 3 CDC 2 NIOSH 3 NIEHS 2 NCI 1	EPA 5 CDC 2 NIOSH 2
3. Identification and Monitoring of Environmental Pollutants	EPA 18 NCHS 1 CDC 2 NIOSH 6 FDA 1 NCI 3	EPA 10 NCHS 1 NIOSH 3	EPA 10 NCHS 1 CDC 2 NIOSH 4	EPA 17 CDC 2 NIOSH 3
4. Identification and Analysis of Sources	EPA 10 NCHS 1 CDC 1 NIOSH 6	EPA 3 NCHS 1 NIOSH 3	EPA 7 NCHS 1 CDC 1 NIOSH 4	EPA 11 CDC 1 NIOSH 3
5. Environmental Transport and Transformation Analysis	EPA 7 NIOSH 6	EPA 4 NHLBI 1 NIOSH 3	EPA 4 NHLBI 1 NIOSH 4	EPA 12 NIOSH 3
6. Sampling, Analytic, and Monitoring Methods	EPA 9 NIOSH 2	EPA 4 NCHS 1 NIOSH 2	EPA 6 NHLBI 1 NIOSH 3	EPA 6 NCHS 1 NIOSH 2
7. Collection of Health Statistics	EPA 3 NCHS 3 CDC 2 NIOSH 2	EPA 2 NCHS 5 NIOSH 1	EPA 2 NCHS 4 CDC 2 NIOSH 2	EPA 4 NCHS 3 CDC 2 NIOSH 1

(Continued)

* In many cases, a program will be entered under more than one disease in the same subject category.

Table D-1. Summary of Task Force Programs by Categories and Disease* (Concluded)

Category and Title	Numbers of Research Programs in Each Agency and for Each Disease*			
	Cancer	Heart Disease	Lung Disease	Nonspecific
8. Human Exposure Estimation	EPA 13 NIOSH 3	EPA 8 NCHS 1 NIOSH 2	EPA 8 NIOSH 3	EPA 8 NCHS 1 NIOSH 2
9. Establishment of Cause-and-Effect Association	EPA 7 NCHS 1 CDC 3 NIOSH 4 NCI 5	EPA 4 NCHS 1 NHLBI 3 CDC 1 NIOSH 2 NCI 1	EPA 4 NCHS 1 NHLBI 3 CDC 3 NIOSH 3 NIEHS 1	EPA 5 CDC 2 NIOSH 2
10. Population Risk Assessment	EPA 6 NCHS 2 CDC 3 NIOSH 2	EPA 6 NCHS 3 CDC 1 NIOSH 1	EPA 5 NCHS 2 NHLBI 1 CDC 3 NIOSH 2	EPA 2 NCHS 2 CDC 2 NIOSH 1
11. Estimations of the Costs of Environment-Related Illness	EPA 2 NCHS 1 CDC 1	EPA 1 NCHS 1	EPA 1 NCHS 1 CDC 1	CDC 1
12. Costs of Control and Prevention	EPA 10 NIOSH 2 NCI 3	EPA 3 NIOSH 1	EPA 5 NHLBI 1 NIOSH 1	EPA 5 NIOSH 1
13. Preventive Health	EPA 2 CDC 3 NIOSH 6 NCI 8	EPA 1 CDC 1 NIOSH 3	NHLBI 1 CDC 3 NIOSH 4	CDC 2 NIOSH 3
14. Education of the Public and of Health Professionals	EPA 5 CDC 2 NCI 1	EPA 2 CDC 1	EPA 2 CDC 2	EPA 3 CDC 1
15. Pollutant Control Measures	EPA 13 NIOSH 4 NCI 3	EPA 6 NIOSH 2	EPA 6 NHLBI 1 NIOSH 2	EPA 9 NIOSH 2

* In many cases, a program will be entered under more than one disease in the same subject category.

DEFINITIONS OF 15 CATEGORIES USED IN THE PROGRAM INVENTORY

1. Determination of Biological Effects and Dose-Response Relationships includes research that identifies the nature and range of biological effects associated with pollutants and research concerned with the quantitative characterization of the relationship between varying dosages of pollutants and the biological effects of such dosages. Studies in this category are typically laboratory in nature.

2. Understanding Mechanism or Mode of Biological Effects includes research that evaluates the mode and extent of entry of environmental pollutants into the human body, their body pathways, toxin endpoints, and residence time. Studies of mechanisms of cellular or subcellular interactions with pollutants also are included.

3. Identification and Monitoring of Environmental Pollutants includes characterization, chemical analyses and monitoring of pollutants for research studies. Operational monitoring for regulatory purposes or for the fulfillment of legislative mandates is not considered to be within the purview of Task Force concerns at this time and is excluded from this definition. Research on measurement of the presence and concentrations of pollutants in various media and various environmental settings is the principal aspect of work performed in this category.

4. Identification and Analysis of Sources refers to investigations of sources of environmental pollutants that may impact on human health. These studies are either pollutant-specific or source-specific. The former

includes research addressed to identifying and characterizing various sources from which a specific pollutant is emitted. The latter addresses the type, amount, and manner of release of various contaminants from a single source or type of source.

5. Environmental Transport and Transformation Analysis studies predict environmental concentrations of a pollutant based on understanding of its transport processes and the physical or chemical changes that occur during such transport. Primary tools in such studies are analytical or physical models of environmental transport and transformation. Included in this category are studies that attribute concentrations of pollutants in the ambient environment to sources.

6. Development of Sampling, Analytic, and Monitoring Methods is aimed at developing better environmental sampling techniques, laboratory analysis methods and monitoring equipment.

7. Collection of Health Statistics consists of all programs that involve the gathering of health information in order to create data bases of general utility. Morbidity, mortality, and health status data collected to provide baseline information are included in this category. The objective of these programs is often the reporting of statistics, in contrast to using them in assessment of cause-and-effect association and other research projects. (A separate category for cause-and-effect association is included.)

8. Human Exposure Estimation involves studies that estimate the magnitude of the level of exposure of individuals to pollution through various pathways over defined periods of time. Precise estimation of human

exposures requires modeling or monitoring of ambient, residential, and occupational environments.

9. Establishment of Cause-and-Effect Association encompasses epidemiological studies of disease incidence. This category of study seeks to associate variation in environmental exposure with the prevalence of disease while controlling for other factors that may influence the prevalence of disease.

10. Population Risk Assessment studies integrate the results of various studies included in the categories defined above for estimation of risk to the population due to a particular pollutant or type of source. These studies can assist in the establishment of priorities for research and for regulation of environmental pollutants.

11. Estimations of the Costs of Environment-Related Illness include studies that evaluate the direct and indirect economic impact of environmental pollution on human health. This category includes evaluations of human morbidity costs attributable to environmental pollution, and estimation of future health care costs that would be avoided if pollution could be reduced by specified amounts.

12. Costs of Control and Prevention studies estimate and evaluate the economic costs of implementing pollutant control programs. This category includes studies involved with the estimation of costs of control and prevention as well as cost-benefit analyses related to the implementation of specific pollution control programs.

13. Preventive Health includes a range of programs aimed at the avoidance or minimization of harmful effects of pollutant agent exposure.

Programs that are specifically directed toward education and pollution control (discussed below) are excluded. An example of a preventive health program is the screening of workers with potential cardiovascular problems from work environments particularly hazardous to such persons.

14. Education of the Public and of Health Professionals consists of programs directed toward improving the capability of the medical professional in recognizing and treating environmental disease, efforts to educate the general public about environmental hazards as a means of prevention of environment-caused illness, and programs to educate the public in environmental disease awareness. Grant programs to health professional training institutions that have these objectives appear in this category.

15. Pollutant Control Measures include efforts that establish or evaluate measures of control and the development of pollutant control methodologies. This category includes research programs directed at improving control devices to reduce pollutants released into the environment as well as programs directed toward reducing exposure to pollutants by alteration of source or receptor patterns.

AN EXAMPLE OF THE TASK FORCE ACTIVITY IN RISK ASSESSMENT

The purpose of the report* titled A Comparison of Scientific and Procedural Bases Used by Federal Agencies for the Regulation of Carcinogens is to begin summarizing the risk assessment activities currently being conducted by Federal Agencies, interagency groups, scientific

* This report is available separately; see Appendix C.

panels, and private groups in the field. The term scientific bases refers to the methods by which data on a given hazard are gathered, analyzed, and evaluated when the objective is to determine the threat that the hazard may pose to human health. Procedural bases refer to methods for choosing the steps that a Federal Agency takes under the law to reduce or eliminate a threat to human health that has been identified on the appropriate scientific bases. It is acknowledged that the demarcation between these two concepts is not completely clear, and that they are not mutually exclusive under all circumstances. The brief description below summarizes aspects of scientific bases for several Federal Agencies. For details, the reader is referred to the report.*

Carcinogens are treated differently from other toxic substances by most Federal Agencies in that any substance found to be carcinogenic is deemed carcinogenic at any level of exposure. No safe threshold is believed to exist. The key question is, with how much certainty is its carcinogenicity known; that is, how strong is the evidence?

Various Federal Agencies and other authorities have recently published their scientific and, where appropriate, regulatory positions on this question. Four positions are summarized in Table D-2: the Consumer Product Safety Commission (CPSC), the Occupational Safety and Health Administration (OSHA), the U.S. Environmental Protection Agency (EPA), and the International Agency for Research on Cancer (IARC). IARC's categories are included because of the continuing interest of the scientific and regulatory community

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* This report is available separately; see Appendix C.

in IARC's research, and because their treatment is the only non-Federal categorization that lends itself to such comparison. Each Agency has classification schemes for the amount of certainty possible concerning a substance's carcinogenicity given the type and quality of the available data. Comparing the categorization, Table D-2 reveals that the evidence and criteria required by each Agency to place a given hazard in a particular category are not completely identical. However, the degree of variation within a category in the table is not serious enough to affect the comparison. For example, under the first (or most certain) column of the table, the criteria are similar from Agency to Agency.

Moving to the right in Table D-2, differences begin to appear among the entries. These are differences in detail, however, and do not affect the decreasing certainty about the carcinogenicity of a substance categorized as moderate or low certainty by the various Agencies. Similarities and differences will become evident as the table is studied.

Table D-2. Comparison of Carcinogen Classification Schemes and Criteria

Agency	Label, Description and Evidence Required	Category for Carcinogens Identified with the Highest Order of Certainty	Category for Carcinogens Identified with Moderate Certainty	Low Certainty Carcinogens (Also inadequate or no data)	Special Categories or Considerations
OSHA	• Label • Description • Evidence Required	• Category I Toxic Substance* • Potential Occupational Carcinogen • Human (epidemiology) or 2 mammalian species or 1 mammalian species replicated or 1 mammalian plus short-term test?	• Category II Toxic Substance* • Evidence suggestive of carcinogenicity • If the data at left are only suggestive, i.e., not adequate or 1 mammalian species plus any other convincing evidence	• Category III Toxic Substance** • Meager or no valid evidence • Meager or no valid scientific evidence that substance has carcinogenic potential; may include cases of lack of carcinogenic activity	• Category IV Toxic Substance** • Substances not found in American workplace, and therefore not to be controlled
CPSC	• Label • Description • Evidence Required	• Category A • Strong evidence of carcinogenicity • Human (epidemiology) or 2 test animal species or 1 test animal species replicated or 1 test animal species plus short-term tests?	• Category B • Suggestive evidence of carcinogenicity • Human or animal data are statistically inconclusive or methodologically deficient or short-term positive data only or 1 test animal species unreplicated and unsupported by short-term tests	• Category C • Very limited evidence, or member of carcinogenic class • Very limited evidence, but question of carcinogenicity has been raised or Member of a "carcinogenic class"	• Category C • Substances previously classified A, B or C, but at time of reclassification, evidence does not indicate carcinogenic potential
EPA	• Label • Description • Evidence Required	• High-Probability Human Carcinogen • "Best" or "Substantial evidence • "Best": Human (epidemiology) plus confirmation animal tests or "Substantial": 1 or more test animal species (tumors include pre-malignant benign)	• Moderate-Probability Human Carcinogen • "Suggestive" evidence • Animal species with benign tumors that are not pre-malignant or Indirect tests (mutagenicity, in vitro cell transformation, and mice initiation-promotion skin tests, e.g.)	• Low-Probability Human Carcinogen • "Ancillary" evidence • Systematic studies that relate chemical structure to carcinogenicity	• When considering the weight of evidence, a preliminary evaluation of ambient exposure will also be made
IARC	• Label • Description • Evidence Required	• Group 1 • Carcinogenic for humans • Sufficient evidence - Human or Multiple species or strains or Multiple experiments or To an unusual degree (incidence, type, site, age) Support: dose-response, mutagenicity, structure	• Group 2 • Probably carcinogenic • Limited evidence single species, strain or experiment or Data are inadequate or Spontaneous or difficult-to-classify neoplasms	• Group 3 • Cannot be classified • Inadequate evidence because data has major qualitative or quantitative limitations or Negative evidence or No data	

Footnotes:

* Criteria for OSHA's Categories I and II were modified slightly in its final regulations (see Appendix A, Section 91. In general, as more fully discussed below, Category I toxic substances are those whose carcinogenicity, as defined, has been determined in humans or in two or more mammalian species of test animals or in one species if the results of that study have been replicated. Category II toxic substances are those whose carcinogenicity has been reported but the evidence for some reason is only suggestive, as defined, or positive in one species, but not yet replicated. Category III toxic substances are those for which the evidence is inadequate to raise any concern regarding carcinogenicity or where the evidence consists of animal data in a single species that is less than suggestive. (42 FR 54165).

** OSHA's Categories III and IV are not included in its final set of regulations (see Appendix A, Section 91. In sum, on review of the Record, OSHA has concluded that the advantages to be gained by maintaining these proposed categories would not justify the expenditures of time and Agency resources necessary to conduct the required scientific reviews. Accordingly, Categories III and IV are not included in this final set of regulations. In cases in which a rulemaking is conducted on a substance proposed for classification into either Category, OSHA will make a public statement of this finding but will not make a formal Category III designation for such a substance. Similarly, if a rulemaking is initiated on a substance proposed for classification as Category I or Category II, and if information is received which satisfies OSHA that the substance is not found in workplaces in the United States, OSHA will make a public statement of this finding, but will not make a formal Category IV designation for such a substance.

* An additional basis for OSHA Category I: Any other scientific evidence that the Secretary of Labor finds sufficient.

* Two additional bases for CPSC Category A: That NCI has found the substance to be a human or animal carcinogen, or that the Commission finds that there is other evidence sufficiently compelling to warrant that classification.

Appendix E

DEVELOPMENT OF RECOMMENDATIONS

Appendix E

DEVELOPMENT OF RECOMMENDATIONS

THE INITIAL PROCESS

A tentative set of steps to implement the conceptual approach described in Section 2 has been developed. These involve substantial scientific and planning input from within and outside of the Federal Government in order to bring systematic attention to each pertinent research area.

The general scope of subject matter is defined by the categories used for reporting Agency funding in the previous annual reports to Congress (Table E-1). This initial taxonomy will be further expanded by including separate consideration of cancer and heart and lung diseases and will be made more specific by definition of objectives within each category.

Table E-1. Categorization Scheme Used for Reporting Funding of Agency Programs

Category	Title
1	Determination of biological effects and dose-response relationships
2	Understanding mechanism or mode of biological effects
3	Identification and monitoring of environmental pollutants
4	Identification and analysis of sources
5	Environmental transport and transformation analysis
6	Sampling, analytic, and monitoring methods
7	Collection of health statistics
8	Human exposure estimation
9	Establishment of cause-and-effect association
10	Population risk assessment
11	Estimations of the costs of environment-related illness
12	Costs of control and prevention
13	Preventive health
14	Education of the public and of health professionals
15	Pollution control measures

The implementation process at this stage is planned in terms of four major activity groups and represents an integration of information suitable for identification of program needs and formulation of recommendations. These activities may be described as follows:

1. Define Overall Objectives, Scope, and Specific Activities

   - Define objectives, scope, and specific activities for the series of Task Force efforts that will lead to research program recommendations.

   - Define an initial set of major research objectives that provide comprehensive coverage within the first 10 categories of Table E-1. These objectives, as they become increasingly refined into more specific terms, will be of key assistance in identifying and defining research needs, current and planned research program efforts, and recommendations made by a variety of groups that have previously addressed these subject areas. Includes work of Task Force Project Groups and collaboration with member Agency planning groups.

2. Integrate Available Recommendations with Information on Current/Planned Research Programs

   - Refine and update current inventory of Task Force Agency programs to provide detailed and uniform information.

   - Compile information at an aggregate level on current Task Force Agency programs.

   - Classify and summarize current/planned programs on the basis of the comprehensive set of program objectives defined in Step 1, utilizing the Program Inventory expanded as required and input from Agency planning and advisory groups.

   - Collate and summarize relevant recommendations for research and prevention initiatives by previous workshops, working groups, etc., using the same structure of research objectives.

- Refine program objectives and classification structure to permit analysis of previous recommendations and current/planned programs, in order to provide preliminary comparison of identified needs with the overall Federal program.

3. Summarize Current Status of Progress and Identify Needs for New or Redirected Initiatives

   - Using input from Agency planning groups and other expert groups, develop overviews of current scientific understanding for each defined objective, with particular focus on those objectives that may have received insufficient attention by previous expert groups as identified in Step 2.

   - Reanalyze scientific information and program needs based on deficiencies suggested in Step 2 and those additional deficiencies identified in Step 3.

   - Compare a new set of research needs and preventive strategies with the current/planned effort to define a final set of needs in terms of specific objectives. (Special workshops or seminars may be required to address needs in scientific areas that have received insufficient recent attention.)

4. Develop Comprehensive Program Recommendations

   - Define recommendations for scientific objectives needing attention.

   - Define recommendations for emphasis and extent of resources that should be applied to specific program objectives and related activities such as data base development.

   - Define recommendations for interagency coordination, joint programs and other mechanisms that would promote achievement of research objectives.

   - Promote thorough review of proposed recommendations within Task Force member Agencies.

   - Formulate final Task Force recommendations.

The procedures described previously will be further studied and modified as necessary and will be implemented on an exploratory basis until they are considered satisfactory. They will then become a continuing part of the Task Force's activities.

A FIRST-STAGE IMPLEMENTATION

The overall scheme and procedures described earlier are intended to lead to comprehensive and needed recommendations. An abbreviated exercise was conducted to test the feasibility of using the existing first-stage Program Inventory, and to determine if recommendations could emerge from a shortened procedure. While this abbreviated procedure might be able to generate useful initial recommendations, it was nonetheless recognized that it would almost certainly bypass important areas of research needs that the more detailed systematic procedure would identify.

The process of developing initial recommendations consisted of a stepwise elimination procedure. This is outlined below:

- Those program categories for which recommendations were already being developed in other Task Force efforts were eliminated first, i.e., exposure and metabolic mechanisms, and education.
- The next step used the initial version of the Program Inventory to identify categories that appeared to be lacking in effort. (This apparent lack of effort may be an incorrect impression to be corrected at a later step, or it may be an appropriate level of effort, also determined in a later process.*)

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* Note that the converse (the presence of a number of projects in any given category) does not necessarily mean that the cell is being adequately treated. Such a case is not amenable to this shortened treatment; it requires the more detailed, systematic treatment described earlier.

- Recommendations from other sources were then classified with the categorization scheme* (Table E-1).

- Having selected one of the surviving candidate categories,** further steps involved study of the recommendations from other sources, selecting one that fits the above requirements, and recycling it through the detailed program descriptions in that category to determine whether it was covered in one or more of the ongoing research programs. If it was, another recommendation was selected and the process repeated. If it was not, then that recommendation was set aside for further consideration by the Agency or Agencies involved to determine whether it is covered in whole or in part in some way not reflected in the Program Inventory. If it still survived, then it would be subject to whatever consideration is appropriate, depending on its subject and scope, by the Task Force.

The sets of earlier recommendations have been screened against the inventory: (1) NIEHS' 1976 report (hereinafter called NIEHS 1976), Human Health and the Environment--Some Research Needs, and (2) the Cooperative Agreement for the Evaluation of Current Environmental Research and Establishment of Priorities, October 1979, by the Pennsylvania State University and the U.S. Environmental Protection Agency (hereinafter called the PSU/EPA).

The NIEHS 1976 document was produced through the collective efforts of over 80 scientists, each well recognized for their efforts in their individual scientific fields, who worked for more than a year to develop a 5-year research plan related to environmental health issues. The PSU/EPA document, which was published in 1979, is the product of working committees

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* Other categorization procedures have been suggested and will be exploited as this procedure is pursued. These include, for one, categorizing according to the disease (cancer)/organ (heart and lung) concept of the Task Force, and subsequently into the 15 categories.

** These are (3) Identification and monitoring of environmental pollutants, (4) Identification and analysis of sources, (11) Estimations of costs of environment-related illness, and (13) Preventive health.

of 120 invited scientists from Government and from academia throughout the country, including some who participated in the NIEHS 1976 working committees. These scientists worked in groups of six in 20 working committees. Then 20 scientists were selected from the total group as participants for a second round of meetings because of their expertise in the specific areas where questions had been raised. These reports were processed as described previously focusing on the four candidate Program Inventory categories.* Each of the recommendations was considered and updated or modified where appropriate to suit the Task Force concerns.

The use of the abbreviated approach resulted in three types of recommendations for consideration by the Task Force member Agencies, which included: specific areas of research, research planning, and costs of environment-related diseases.

Specific Areas of Research

- Multimedia Pollutant Exposure and Health Effects: Research on the relative contribution of various media is needed in order to quantify more accurately the toxicological effects and the risk to human health, and to develop strategies for control of pollutants.

- Transport and Fate of Pollutants in the Biosphere and Food Chain: Research efforts are needed on a comparative analysis of various residuals in air, water, soil, plant, animal and human tissues. Further studies should evaluate how the pollutant is modified as it moves through the food chain. The development of rapid, inexpensive, and reliable methods for analyzing food contaminants and residuals in biological specimens is also needed.

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* These are (3) Identification and monitoring of environmental pollutants, (4) Identification and analysis of sources, (11) Estimation of costs of environment-related illness, and (13) Preventive health.

- Biological and Chemical Measurement Methodology and Data Analysis: Research on methodology of measurements and on data analysis is needed both to assist in the achievement of less expensive study designs and to improve the collection and evaluation of scientific data.

- Pollutants in Ground and Surface Water Sources: Comprehensive research to identify the major pollutants in ground and in surface water, their persistence and transport, and health effects should be undertaken.

Research Planning

The recommendation on research planning that was developed out of major areas in both the NIEHS 1976 and the PSU/EPA studies is that information on the individual Agencies' technological forecasting/research planning processes and their results should be interchanged among the Task Force Agencies. This concept has been integrated into the overall conceptual scheme procedure for the development of comprehensive recommendations, as described previously. In addition:

> Use of recommendations from other planning groups (NIEHS, PSU/EPA, etc.) will continue to be incorporated in the Task Force's identification of research needs.

Costs of Environment-Related Diseases

The Secretary of the U.S. Department of Health and Human Services and the Institute of Medicine, in cooperation with other appropriate entities of the Federal Government, are engaged in planning an ongoing study of the costs of health effects of environmental hazards. The NCAQ

is also currently engaged in efforts to evaluate costs of environment-related diseases.

> The Task Force needs in the area of health costs of environmental-related diseases will be identified. The Task Force will continue to work with NAS/IOM Planning Committee for the Ongoing Study of Costs of Environment-Related Health Effects and the NCAQ in meeting these needs.

The preliminary approach described above is considered to demonstrate the promise of certain aspects of the procedure described in the beginning of this appendix, and to confirm the need for the rest of it.

Appendix F

PROJECT GROUP ON EXPOSURE AND METABOLIC MECHANISMS
Preliminary Conclusions for Research Requirements

Appendix F

PROJECT GROUP ON EXPOSURE AND METABOLIC MECHANISMS
Preliminary Conclusions for Research Requirements

Listed below are the complete conclusions that are cited in Section 2. These conclusions were formulated during the first four meetings of the Project Group.

- Well-planned, comprehensive exposure assessment studies are needed to evaluate and quantify levels of pollutant exposure within a specific geographical area for further use in epidemiological studies.

- Small, personal dosimeters designed to measure low-level air contaminants and particulates are an essential component in comprehensive exposure assessment.

- Identification and definition of population activity patterns describing the lifestyles, socioeconomic characteristics, and movements of specific subgroups of individuals are needed.

- Research is needed to ascertain the animal models that most closely simulate humans in order to evaluate low-dose chronic exposure events and to ascertain active metabolites that are most likely to occur in humans.

- Research is needed to further define the pharmacokinetics of foreign compounds in animal models and to relate these data to humans for prediction of chronic exposure symptoms and identification of high-risk populations.

- Improvement is needed in initial screening of new chemicals using combinations of in vitro systems followed by in vivo study of selected compounds to validate the short-term assays.

- Research is needed to characterize the mechanisms of carcinogen/toxicant metabolism at the subcellular level including specific enzyme activities and macromolecular modifications.

- Research is needed to identify additive, synergistic, and inhibitory interactions of chemicals and/or carcinogenic mixtures to which the human population is exposed.

- Research needs to be conducted in a comprehensive multidisciplinary program that includes studies in toxicology, pharmacology, metabolism, and biochemistry to more directly relate exposure to toxicants and their mechanism of toxicity with detection and prevention of environment-related disease.

These conclusions were formulated at the May 19, 1980, meeting of the Project Group and are not covered in the Group's detailed activity report.

- Current data bases of human exposure to toxicants via air, water, and food are inadequate for modeling and/or animal-to-human research extrapolations.

- Current epidemiological studies generally fail to incorporate accurate measurements of agents and levels of exposure.

- Innovative and aggressive approaches are needed for studying potential high-risk groups, e.g., reproductive effects of occupational exposure to toxic substances.

- Retrospective epidemiology studies can be improved through the collection of additional lifestyle information, such as accurate occupational and residence histories and known exposures to specific agents.

- Prospective epidemiology studies are needed in order to predict potential exposures, identify/forecast numbers of exposed persons, and predict health effects/disease incidence.

- Improved, less expensive analytical techniques are needed for identification and measurement of chemical and pesticide residues in food.

- Improved analytical techniques and miniaturization of exposure measurement devices are needed, especially for particulates (fiber, flyash, diesel fuel emissions, and foundry products).

- Substantial data must be collected and analyzed relative to indoor pollutants and the associated health effects.

- New, noninvasive analytical techniques must be developed for identification and measurement of human metabolites.

- Sociological modeling needs greater emphasis.

- Studies of the mechanisms of toxicity and malignant transformation should be coordinated by a national, comprehensive effort to include in vivo and in vitro metabolism, activation, and detoxification; scavenging mechanisms; DNA damage and repair; and gene expression.

- Pure basic research efforts coupled with adequate funding are needed in areas such as effects on the reproductive system to provide basic knowledge for future studies.

- Biochemists, biologists, molecular biologists, and other scientists whose research fields cannot support available personnel, should be retrained in the field of environmental toxicology at comprehensive research centers.

Appendix G

MEETING DATES

Appendix G

MEETING DATES

TASK FORCE

October 18, 1979
April 23, 1980

WORKING GROUP

August 29, 1979
November 14, 1979
January 16, 1980
February 13, 1980
March 28, 1980
June 12, 1980
July 1, 1980

PROJECT GROUP ON EDUCATION OF THE PUBLIC AND OF HEALTH PROFESSIONALS

July 5, 1979
September 10, 1979
November 30, 1979
December 18, 1979
December 28, 1979
January 14, 1980
February 25, 1980
May 6, 1980

PROJECT GROUP ON EXPOSURE AND METABOLIC MECHANISMS

September 18, 1979
December 14, 1979
January 22, 1980*
January 31, 1980**
May 19, 1980

PROJECT GROUP ON STANDARDIZATION OF MEASUREMENTS AND TESTS

October 23, 1979
March 19, 1980

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* Subgroup on Exposure.
** Subgroup on Metabolic Mechanisms.

PROPOSED MEETING DATES FOR 1980-81

Meeting	Day and Date
Working Group	Thursday, September 11, 1980
Working Group	Wednesday, October 15, 1980
Working Group	Wednesday, December 17, 1980
Working Group	Wednesday, January 21, 1981
Working Group	Wednesday, March 4, 1981
Task Force	Wednesday, April 15, 1981
Working Group	Thursday, May 28, 1981
Working Group	Thursday, July 2, 1981